

Division: Professions
Board: Florida Building Commission
Rule Number: 61G20-1.001
Rule Description: Florida Building Code Adopted
Contact Person: Mo Madani

Please remember to analyze the impact of the rule, NOT the statute, when completing this form.

A. Is the rule likely to, **directly or indirectly**, have an adverse impact on economic growth, private-sector job creation or employment, or private-sector investment in excess of \$1 million in the aggregate within 5 years after the implementation of the rule? No.

- | | | |
|--|------------------------------|--|
| 1. Is the rule likely to reduce personal income? | ☐ Yes | ☒ No |
| 2. Is the rule likely to reduce total non-farm employment? | ☐ Yes | ☒ No |
| 3. Is the rule likely to reduce private housing starts? | ☐ Yes | ☒ No |
| 4. Is the rule likely to reduce visitors to Florida? | ☐ Yes | ☒ No |
| 5. Is the rule likely to reduce wages or salaries? | ☐ Yes | ☒ No |
| 6. Is the rule likely to reduce property income? | ☐ Yes | ☒ No |

Explanation: **NA**

If any of these questions are answered "Yes," presume that there is a likely and adverse impact in excess of \$1 million, and the rule must be submitted to the legislature for ratification.

B. Is the rule likely to, **directly or indirectly**, have an adverse impact on business competitiveness, including the ability of persons doing business in the state to compete with persons doing business in other states or domestic markets, productivity, or innovation in excess of \$1 million in the aggregate within 5 years after the implementation of the rule? No.

- | | | | |
|----|---|---|--|
| 1. | Is the rule likely to raise the price of goods or services provided by Florida business? | ☐ Yes | ☒ No |
| 2. | Is the rule likely to add regulation that is not present in other states or markets? | ☒ Yes | ☐ No |
| 3. | Is the rule likely to reduce the quantity of goods or services Florida businesses are able to produce, i.e. will goods or services become too expensive to produce? | ☐ Yes | ☒ No |
| 4. | Is the rule likely to cause Florida businesses to reduce workforces? | ☐ Yes | ☒ No |
| 5. | Is the rule likely to increase regulatory costs to the extent that Florida businesses will be unable to invest in product development or other innovation? | ☐ Yes | ☒ No |
| 6. | Is the rule likely to make illegal any product or service that is currently legal? | ☒ Yes | ☐ No |

Explanation:

The 2026 update to the Florida Building Code (“the Code”) will add certain construction requirements that are not present in other states. Some examples include the following:

(1) Wind Protection: Florida faces a higher risk of hurricanes than most other states. As a result, the Florida Building Code includes enhanced requirements for wind resistance, water intrusion prevention, and hurricane protection that go beyond the national model codes on which it is based. These provisions address the design and installation of building components to reduce wind damage and water infiltration, strengthen soffit systems against hurricane forces, and incorporate the latest industry standards and design practices to improve overall building resilience.

(2) Energy Standards: Florida is warmer and more humid than many other states and therefore has specific needs for energy conservation measures that may exceed the requirements of the national model codes. The Code includes additional provisions that address efficiency measures required by federal law, minimum efficiency standards for equipment, modified compliance requirements for the simulated building performance method, specific design criteria for hot water distribution systems, roof energy efficiency requirements, lighting control requirements, measures that promote the use of renewable energy technologies, additional efficiency measures, procedures for calculating energy credits for both existing and new measures, and duct testing requirements for buildings that comply with the energy performance compliance option.

(3) High-Velocity Hurricane-Zones (Miami-Dade and Broward counties): To continue to preserve the South Florida Building Code’s hurricane protection standards, the updated edition of the Code will include stricter design and construction measures, including the requirements to protect the overall building (the entire envelope), for these two counties.

(4) Construction-Related Requirements Established by Other State Agencies: The Code incorporates building standards adopted or promoted by various state agencies with jurisdiction over specific types of facilities. These standards include special construction requirements for hospitals, nursing homes, ambulatory surgical centers, birthing centers, educational facilities, swimming pools, public lodging establishments, manufactured buildings, boot camps for children, mausoleums and columbariums, adult day care and child care occupancies, termite protection, radiation hazard control, hospice inpatient facilities, elevators and conveying systems, and structures located seaward of a coastal construction control line.

(5) The updated Code will include revisions to numerous product material standards and mechanical equipment performance standards. Failure to comply with these standards may result in a product being deemed noncompliant with the Code.

If any of these questions are answered “Yes,” presume that there is a likely and adverse impact in excess of \$1 million, and the rule must be submitted to the legislature for ratification.

C. Is the rule likely, **directly or indirectly**, to increase regulatory costs, including any transactional costs (see F below for examples of transactional costs), in excess of \$1 million in the aggregate within 5 years after the implementation of this rule? Yes.

1. Current one-time costs
2. New one-time costs
3. Subtract 1 from 2
4. Current recurring costs

5. New recurring costs
6. Subtract 4 from 5
7. Number of times costs will recur in 5 years
8. Multiply 6 times 7
9. Add 3 to 8

If 9. is greater than \$1 million, there is likely an increase of regulatory costs in excess of \$1 million, and the rule must be submitted to the legislature for ratification.

Note: The Commission is unable to quantify the fiscal impact of the 2026 update to the Code because the cost of any particular work governed by the Code will depend on the choices made by consumers, design professionals, and contractors. In many cases, multiple methods are available to satisfy Code requirements. As a result, the design options selected by consumers and the compliance paths chosen by design and construction professionals would need to be considered in any effort to quantify the fiscal impact of specific Code updates.

However, based on the information submitted with the proposed Code provisions, few of the updates are expected to have a significant financial impact. In fact, most of the updates are intended to provide the following benefits:

- (1) Clarification of Code provisions and the inclusion of additional compliance options, which may improve Code enforcement and implementation while reducing the cost of compliance for building construction;
- (2) The use of more efficient design solutions and technologies that have gained national acceptance;
- (3) Direct compliance with Florida legislative mandates;
- (4) Responses to requests for Code changes from the construction industry, competing material groups, system manufacturers, government agencies, building officials, and the general public;
- (5) Inclusion of provisions that address demonstrated Florida-specific needs; and
- (6) Resolution of conflicts within the existing Code.

Also, please see the Appendix.

D. Good faith estimates (numbers/types):

Any individual or entity engaged in construction activities is required to comply with the Florida Building Code, which will be updated through the proposed rule. The number of individuals and entities affected by the proposed Code update cannot be precisely determined because it depends on decisions made by consumers of construction services and products to undertake projects subject to the Code.

General categories of affected parties include building designers, construction tradespeople, construction material manufacturers and suppliers, code enforcement personnel, and consumers. The numbers of licensed professionals who would be required to comply with the rule are as follows:

Building Code Administrator/Inspector:	10,171
Electrical Contractor:	14,987
Engineer:	67,827
Construction Industry:	86,541
Architecture and Interior Design:	13,913

2. A general description of the types of individuals likely to be affected by the rule.

Local building officials, contractors, engineers, architects, interior designers, product manufacturers, construction trade entities, and consumers.

E. Good faith estimates (costs):

Cost to the department of implementing the proposed rule:

☒ None.

The department intends to implement the proposed rule within its current workload, with existing staff.

☐ Minimal.

☒ Other.

The Florida Building Commission and the Department do not enforce the Florida Building Code and serve only a limited role in its implementation.

Cost to any other state and local government entities of implementing the proposed rule:

☐ None. This proposed rule will only affect the department.

☐ Minimal.

☒ Other.

Local government entities already implement and enforce the Florida Building Code. The purpose of the rule is to update the Code by adopting the latest editions of certain national model codes developed by the International Code Council and incorporating additional stakeholder-submitted amendments. The selected model codes, together with the Florida-specific amendments, will comprise the 2026 Florida Building Code in accordance with the update and amendment procedures specified in sections 553.73(3), (7), and (9), Florida Statutes.

Implementation of the updated Code may result in some costs associated with training for enforcement personnel, as well as costs incurred by local and state governments to the extent they are consumers of construction services. However, ongoing training is a routine aspect of Code administration within the construction industry, and the rule is not expected to impose costs beyond those ordinarily anticipated by state and local governments.

Cost to the department of enforcing the proposed rule:

☒ None. The Commission intends to carry out the proposed rule as part of its current workload and with existing staff.

☐ Minimal.

☒ Other.

The Florida Building Commission/Department does not enforce the Florida Building Code and serves a limited function with regard to its implementation.

4. Cost to any other state and local government of enforcing the proposed rule:

☐ None. This proposed rule will only affect the department.

☐ Minimal.

☒ Other. See Item #. 2 above.

F. Good faith estimates (transactional costs) likely to be incurred by individuals and entities, including local government entities, required to comply with the requirements of the proposed rule. Such costs may include: filing fees; expenses to obtain a license; necessary equipment; installation, utilities for, and maintenance of necessary equipment; necessary operations or procedures; accounting, financial, information management, and other administrative processes; labor; materials and supplies; capital expenditures, including financing costs; professional and technical services; monitoring and reporting; qualifying and recurring education, training, and testing; travel; insurance and surety requirements; administrative costs and other overhead; reduced sales or other revenue.

☐ None. This proposed rule will only affect the department.

☐ Minimal.

☒ Other.

Licensees in construction-related fields, as well as their employees, may require additional training to familiarize themselves with changes to the Florida Building Code that are relevant to their profession. With respect to materials and supplies, the Commission is unable to quantify the impact beyond the analysis provided in the Appendix and Item C above because such a determination depends on the specific activities undertaken that are regulated by the Code.

As noted previously, certain provisions incorporated into the Code may have a positive effect or may reduce construction costs. Please see the Appendix for information regarding proposed modifications which may increase the cost of construction.

G. An analysis of the impact on small businesses as defined by s. 288.703, F.S., and an analysis of the impact on small counties and small cities as defined by s. 120.52, F.S.

A small business is defined in Section 288.703, F.S., as "...an independently owned and operated business concern that employs 200 or fewer permanent full-time employees and that, together with its affiliates, has a

net worth of not more than \$5 million or any firm based in this state which has a Small Business Administration 8(a) certification. As applicable to sole proprietorships, the \$5 million net worth requirement shall include both personal and business investments.”

A small county is defined in Section 120.52(19), F.S., as “any county that has an unincarcerated population of 75,000 or less according to the most recent decennial census.” And, a small city is defined in Section 120.52(18), F.S., as “any municipality that has an unincarcerated population of 10,000 or less according to the most recent decennial census.”

The estimated number of small businesses that would be subject to the rule:

- | | | |
|---|---|----------------------------------|
| ☐ 1-99 | ☐ 100-499 | ☐ 500-999 |
| ☐ 1,000-4,999 | ☒ More than 5,000 | |
| ☐ Unknown, please explain: | | |

☒ Analysis of the impact on small business:

The proposed update to the Code is necessary to satisfy the legislative mandate set forth in section 553.73(7)(a), Florida Statutes, which requires the Code to be updated every three years. The analysis contained in the Appendix applies to small businesses.

The proposed 2026 update to the Code may affect small businesses whose activities are subject to its requirements, as well as small counties and municipalities that engage in construction activities and enforce the Code. The Commission is unable to quantify the impact beyond the analysis provided in the Appendix and Item C above because such a determination depends on the specific activities undertaken that are regulated by the Code.

As noted previously, certain provisions incorporated into the Code may have a positive effect or may reduce construction costs. To the extent that some provisions result in increased costs, those impacts may be mitigated by the fact that such costs represent capital investments that can be incorporated into a business plan or recovered through the sale of the asset for which the costs were incurred.

- ☐ There is no small county or small city that will be impacted by this proposed rule.
- ☒ A small county or small city will be impacted.
- ☐ Lower impact alternatives were not implemented? Describe the alternatives and the basis for not implementing them.

H. Market impacts likely to result from compliance with the proposed rule, including: changes to customer charges for goods and services; changes to the market value of goods or services produced, provided, or sold; changes to costs resulting from the purchase of substitute or alternative goods or services; the reasonable value of time to be spent by owners, officers, operators, and managers to comply with the proposed rule, including, but not limited to, time to be spent completing required education, training, or testing.

It is not possible to quantify the market impacts of the mandatory update to the Florida Building Code, since external factors such as consumer choices and the larger economic and demographic situation in the state will have a substantial influence on what construction activity occurs. Some amount of ongoing training for the construction workforce is anticipated, but as the Code has been statutorily-mandated to be updated triennially since its inception this fact is already accounted for, and some of the proposed modifications were put forth by trade organizations themselves in order to clarify or

simplify Code provisions, or to provide alternative means of compliance. Additionally, some of the proposed modifications may reduce the cost of construction. Please see the Appendix for proposed modifications that were identified as having the potential to add to the cost of construction.

I. Any additional information that the agency determines may be useful.

☒ None.

☐ Additional.

J. A description of any good faith written proposal for a lower cost regulatory alternative to the proposed rule which substantially accomplishes the objectives of the law being implemented and either a statement adopting the alternative or a statement of the reasons rejecting the alternative in favor of the proposed rule.

☒ No good faith written proposals for a lower cost regulatory alternative to the proposed rule were received.

☐ Adopted in entirety.

☐ Adopted / rejected in part.

☐ Rejected in entirety.

NOTE: Pursuant to section 120.541(4)(b), Florida Statutes, triennial updates of, and amendments to, the Florida Building Code which are expressly authorized by section 553.73, Florida Statutes, are exempt from the legislative ratification process.

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Florida Building Commission
Statement of Estimated Regulatory Costs (SERC)

Appendix

According to the testimony presented to the Commission and its Technical Advisory Committees, the following 27 code modifications may add cost to construction:

Florida Building Code, Building

Modification F11918: Add new conditions where the “shall be permitted” locks on stairway doors in high-rise buildings are required to unlock to permit re-entry from the stairway into the building.

403.5.3 Stairway door operation.

Stairway doors other than the exit discharge doors shall be permitted to be locked to prevent passage from the stairway side into the building. Stairway doors that are locked to prevent passage from the stairway side into the building shall be capable of being unlocked ~~simultaneously without unlatching upon a signal from the fire command center~~ when any of the following conditions occur:

1. Individually or simultaneously upon a signal from the fire command center.
2. Simultaneously upon activation of a fire alarm signal in an area served by the stairway.
3. Upon failure of the power supply to the lock or the locking system.

403.5.3.1 Stairway communication system.

A telephone or other two-way communications system connected to an approved constantly attended station shall be provided at not less than every fifth floor in each stairway where the ~~doors to the stairway~~ doors are locked to prevent passage from the stairway into the building. Systems shall be listed in accordance with UL 2525 and installed in accordance with NFPA 72.

Information provided by the proponent:

The technical revisions in 403.5.3 add two new conditions where the “shall be permitted” locks on stairway doors in high-rise buildings are required to unlock to permit re-entry from the stairway into the building. These technical revisions are consistent with revisions in F11005 for the 2024 IBC and are consistent with F10607 approved by the Commission for the 2026 FBC-B in Section 1010.2.7 Item 3.

All other revisions in these sections are editorial revisions from IBC proposal E53-24 tentatively approved as modified by committee for the 2027 IBC.

In these sections there’s language that permits stairway doors, where they comply with specified conditions, to be locked preventing passage from the stairway into the building or structure. But, the language used is less clear than the language used in the 1st sentence of this paragraph of this reason statement. Several edits reflect the language of the 1st sentence of this paragraph.

Additional cost to construction:

Enforcement of the code may take a bit more time to verify all three conditions are met where stairway doors in high-rise

buildings are permitted to be locked to control re-entry into the building from the stairway. The proposal may increase the cost of construction of high-rise buildings by requiring two additional conditions to be satisfied where stairway doors are permitted to be locked preventing re-entry into the building.

Modification F11921: This proposal is intended to bring the scope of the applicability of Item 3 to be more closely aligned to the stated intent.

1010.2.4 Locks and latches.

Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In Group I-1, Condition 2 and Group I-2 occupancies where the clinical needs of persons receiving care require containment or where persons receiving care pose a security threat, provided that all clinical staff can readily unlock doors at all times, and all such locks are keyed to keys carried by all clinical staff at all times or all clinical staff have the codes or other means necessary to operate the locks at all times.
3. In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M and S, and in places of religious worship, the main door or doors are permitted to be equipped with key-operated locking devices ~~from the~~ from the which, when locked, prevent egress side provided:

3.1 The doors are the main doors to the building, or the doors are the main doors to the tenant space.

3.42. The locking device is readily distinguishable as locked.

3.23. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

3.34. The use of the key-operated locking device is revocable by the building official for due cause.

Information provided by the proponent:

Prior to the 2017 FBC-B, the applicability of Item 3 was limited to the main exterior doors of a building for the listed occupancies. The sign required by this section stated: THIS DOOR TO REMAIN UNLOCKED WHEN THIS BUILDING IS OCCUPIED. However, for the 2017 FBC-B, item 3 was revised to be applicable to the main doors to a space for the same listed occupancies. The sign required by this section stated: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The intent of the change was to permit the provisions of Item 3 to be applicable to, for example, where the main doors to a restaurant open into a mall.

Unfortunately, Item 3 is sometimes being interpreted as broadly as written: any doors that could be described as the main doors, to any space in the listed occupancies, regardless of the size or use of the space and regardless of how far into the bowels of the building, could be locked with a key operated lock preventing ingress and / or egress. This proposal is intended to bring the scope of the applicability of Item 3 to be more closely aligned to the stated intent: Item 3 would be applicable to the main exterior doors to the building, or the doors are the main doors to the tenant space.

Additional cost to construction:

Should have minimal to no effect on the impact of code enforcement. May increase the cost of construction if a key-operated lock on the egress side of main doors would not be permitted, and a higher cost lock is needed. May decrease the cost of construction as the locations where the key cylinder locks may be permitted may decrease slightly.

Modification F11929: In educational occupancies, this proposal requires, primarily, egress doors from classrooms and other occupiable rooms to be lockable from the inside of the room. This proposal also requires exterior entry doors to be lockable from inside the buildings.

1010.2.8 Locking arrangements in educational occupancies. In Group E occupancies, Group B colleges and

universities, Group A occupancies accessory to Group B colleges and universities, and Group I-4 occupancies, egress doors and exterior entry doors shall comply with Sections 1010.2.8.1 through 1010.2.8.3.

~~1010.2.8~~1010.2.8.1 Locking arrangements Egress doors in educational occupancies.

~~In Group E occupancies, Group B educational occupancies and Group I-4 occupancies, egress~~ Egress doors from classrooms, offices and other occupied rooms shall be provided with locking arrangements designed to keep intruders from entering the room and shall comply with all of the following conditions:

1. The locking arrangements shall be in accordance with Section 453.27.8.1 and in accordance with the Florida 2014 State Requirements for Educational Facilities (SREF) Chapter 5, (8)(c)1. 2nd exception.
2. The doors shall be capable of being locked from inside the room.
3. The doors shall be capable of being unlocked from outside the room with a key or other approved means.
4. The doors shall be openable from within the room in accordance with Section 1010.2.
5. Modifications shall not be made to listed panic hardware, fire door hardware or door closer.
6. Modifications to fire door assemblies shall be in accordance with NFPA 80.

~~Remote locking or unlocking of doors from an approved location shall be permitted in addition to the unlocking operation in Item 1.~~

1010.2.8.2 Exterior entry doors. Exterior doors which provide entry into the building shall be provided with locking arrangements designed to keep intruders from entering the building, and shall comply with all of the following:

1. The doors shall be lockable from the egress side of the door.
2. A minimum of one door on each building face shall be capable of being unlocked from outside the building with a key or other approved means.
3. Each egress door shall be openable from within the building in accordance with Section 1010.2.

1010.2.8.3 Remote locking and unlocking. Remote locking and unlocking of doors from an approved location shall be permitted.

Information provided by the proponent:

In educational occupancies, this proposal requires, primarily, to be able to access the entrance doors from classrooms and other occupiable rooms to be locked from the inside of the room. New Item 1 of renumbered 1010.2.8.1 is for consistency with existing requirements. Section 453.27.8.1 of FBC-B requires classroom locksets: Each door shall be equipped with a lockset, which is readily opened from the side from which egress is to be made at all times. The 2nd exception of Chapter 5 Existing Facilities, section (8)(c)1. of Florida 2014 State Requirements for Educational Facilities (SREF) permits the use of classroom security function door hardware which allows the outside lever to be locked with a key from either inside or outside while keeping the inside lever unlocked for unrestricted egress.

This proposal also requires exterior entry doors to be lockable from inside the buildings.

These proposed requirements are consistent with current practices of design and construction of new schools and are consistent with recommendations by a wide range of school safety and security advocates, including the U.S. Dept. of Homeland Security (DHS), and the Partner Alliance for Safer Schools (PASS).

This proposal is based on FBC-B 2023 with revisions of E57-24 tentatively approved as submitted for the 2027 IBC and further revised to address existing Florida requirements.

Additional cost to construction:

Minimal impact on enforcement of the code, would need to continue to verify doors cannot be locked preventing egress while also verifying the doors can be locked from the interior to prevent intruders from entering the building, space, or room. The proposed requirements may increase the cost of construction. The new requirements are applicable to locks on interior and exterior doors. However, they are consistent with current practices of design of new schools. Thus, the actual increase in cost is nil.

Modification F11930: Adds insulated vinyl siding and backed vinyl siding to table 722.6.2(3).

Adds insulated vinyl siding and backed vinyl siding to table 722.6.2(3).

TABLE 722.6.2(3)

MEMBRANE^a ON EXTERIOR FACE OF WOOD STUD WALLS

SHEATHING	PAPER	EXTERIOR FINISH

For SI: 1 inch = 25.4 mm.

1. a. Any combination of sheathing, paper, and exterior finish is permitted.

Information provided by the proponent:

Table 722.6.2(3) adds backed siding and insulated vinyl siding as an option for use with fire rated assemblies. Backed siding and insulated vinyl siding are equivalent to vinyl siding as an option as cladding that does not impact the fire rating of the assembly.

Additional cost to construction:

Adds between 25% to 50% cost if backed or insulated options chosen.

Modification F12234: This modification adds language to mandate compliance with the recently updated and released (June 12, 2020) edition of UL 2525 Standard for Two-Way Emergency Communications Systems for Rescue Assistance.

403.5.3 Stairway door operation.

Stairway doors other than the exit discharge doors shall be permitted to be locked to prevent passage from the stairway side into the building. Stairway doors that are locked to prevent passage from the stairway side into the building shall be capable of being unlocked ~~simultaneously~~ without unlatching ~~upon a signal from the fire command center~~ when any of the following conditions occur:

1. Individually or simultaneously upon a signal from the fire command center.
2. Simultaneously upon activation of a fire alarm signal in an area served by the stairway.
3. Upon failure of the power supply to the lock or the locking system.

403.5.3.1 Stairway communication system.

A telephone or other two-way communications system connected to an approved constantly attended station shall be provided at not less than every fifth floor in each stairway where the ~~doors to the stairway doors~~ doors are locked to prevent passage from the stairway into the building. Systems shall be listed in accordance with UL 2525 and installed in accordance with NFPA 72.

Information provided by the proponent:

This proposal adds language to mandate compliance with the recently updated and released (June 12, 2020) edition of UL 2525 Standard for Two-Way Emergency Communications Systems for Rescue Assistance, which provides updated and adequate product listing requirements for these critical systems. This will provide guidance to code officials and design professionals.

Additional cost to construction:

Will increase the cost of construction. However, these cost increases are justified as the code requirements to date have not provided the means of designing and installing these systems.

Modification R12064: Testing requirements for edge and ridge metal systems for metal panel roofs over solid and closely fitted decks in hurricane-prone regions.

Replace the original proposal with the following:

1504.3.1.1 Metal hip and ridge covers. Metal roof hip and ridge covers shall be tested for uplift resistance in accordance with ANSI/MCA FTS-1.

Information provided by the proponent:

The purpose of this proposal is to add new requirements to determination of wind load resistance values of metal roof panel assemblies over solid or closely fitted deck in hurricane-prone regions. These changes are consistent with the recommendations of FEMA P-2342.

This proposal also aligns panel testing requirements in hurricane-prone regions with Section 8 of the Florida Building Code (FBC) Test Application Standard TAS-125. This is necessary because UL 580 testing ceases at Class 90 (105 psf net uplift/52.5 psf design load) and will not produce results addressing wind loads in the edge and corner zones required by ASCE 7 2016 in hurricane-prone regions. While UL 1897 does not have this limitation, it lacks the two 1-hour-long oscillating load sequences required by UL 580 and is generally considered less rigorous for that reason. Section 8 of TAS-125 addresses these issues quite well and the resulting practice is already widely used in the metal roofing industry.

Finally, this proposal moves the other roofs section (Currently 1504.4.1) to 1504.4.5 as "other" is typically used at the end

of a list, not the beginning.

Additional cost to construction:

Property owners could see a very slight increase in cost if manufacturers carry additional costs to the consumer. However, the attachment shows this impact to be less than one percent increase.

Modification SP12015: Require an isolation room in the school clinic.

Add section 453.22.6 to read as follows:

453.22.6 Isolation room. An isolation room may be provided in the clinic. The room, designed for a single bed, shall be a minimum of 10 feet by 10 feet (3048 mm by 3048 mm).

453.22.6.1 Door requirements. The door shall swing out of the room and shall be equipped with a nonlocking latch, a closer, and a view panel, with minimum dimensions of 8 inches (203 mm) by 42 inches (1067 mm) and a maximum of 1,296 square inches (0.84 m²), of 1/4-inch (6 mm) tempered or safety glass installed with the bottom edge of the panel at 30 inches (762 mm) AFF.

453.22.6.2 Window requirements. At least one window shall be provided to maintain constant visual supervision from the nurses' station, with a minimum area of 1,944 square inches (1.25 m²), of 1/4-inch (6 mm) tempered or safety glass installed with the bottom edge of the panel at 30 inches (762 mm) AFF.

453.22.6.3 Finishes. All walls, floor, and ceiling of the isolation room shall be impervious.

453.22.6.4 Mechanical. The HVAC system shall maintain a negative pressure with an exhaust fan vented through the roof providing a minimum of 12 air changes of exhaust per hour and a minimum 0.01-inch WC negative-pressure differential to the adjacent space whether or not an ante-room is utilized.

453.22.6.5 Electrical. Lighting shall be at least 100 footcandles (1000 lux) at the bed plane, which can be dimmed to ½ footcandle (5 lux). A minimum of five duplex electrical outlets shall be provided with at least two outlets at the head of the bed.

Information provided by the proponent:

To control the spread of contagious viruses in the school clinic.

Additional cost to construction:

Cost will increase approximately \$6150 per school. This is less than one tenth of one percent of the cost of an average new school.

Modification SP12017: Add provisions for structures in flood hazard areas other than buildings, including structures that are roofed but not walled. Such structures include pole barns, gazebos, platforms, boat shelters, and RV shade structures.

1612.4.4 Structures other than buildings. Structures other than buildings, including structures with roofs that are unwallled or not fully wallled, shall:

1. Be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic loads, including the effects of buoyancy, during conditions of the base flood.

2. Be constructed of flood damage-resistant materials.
3. Have mechanical, plumbing, and electrical systems above the base flood elevation or meet the requirements of ASCE 24, except that minimum electric service required to address life safety and electric code requirements is permitted below the base flood elevation provided it conforms to the provisions of the electrical part of building code for wet locations.

Information provided by the proponent:

Fills an apparent gap in floodplain requirements for structures other than buildings. Adds provisions for those structures, including structures that are roofed but not walled. Such structures include pole barns, gazebos, platforms, boat shelters, and recreational vehicle shade structures. There are no elevation requirements for these structures because unlike buildings that shelter occupancies, they do not have 'lowest floors.' However, they must resist flooding to minimize damage to the structures and to minimize damage caused by battering debris when those structures do not resist loads.

Additional cost to construction:

Provides clarity for structures that do not have explicit requirements in the FBC when those structures are located in flood hazard areas. Some increase costs for structures that have mechanical, plumbing and electrical service.

Modification S11892: Including definitions for insulated vinyl siding and backed siding in the Florida Building Code is necessary to reflect advancements in siding products and ensure clear guidance for designers, contractors, and inspectors.

Insulated Vinyl Siding. A continuous insulation cladding product, with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a thermal resistance not less than R-2.

Backed vinyl siding is a cladding product with a manufacturer-installed foam plastic backing material as an integral part. Where used as insulation, refer to insulated vinyl siding.

1404.9.1 Insulated vinyl siding, backed vinyl siding.

Insulated vinyl siding and *backed vinyl siding* shall be certified and labeled by an approved agency as conforming to ASTM D7793 and D7445 requirements, respectively.

[Modify as follows]

[BS] 1405.14 Vinyl siding.

Vinyl siding, insulated vinyl siding, and backed vinyl siding, conforming to the requirements of this section and complying with ASTM D3679, ASTM D7793, and D7445, shall be permitted on exterior walls where the design wind pressure determined in accordance with Section 1609 does not exceed 30 pounds per square foot (1.44 kN/m²). Where the design wind pressure exceeds 30 pounds per square foot (1.44 kN/m²), tests or calculations indicating compliance with Chapter 16 shall be submitted. Vinyl siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

Information provided by the proponent:

This modification adds backed vinyl siding, as new siding categories in list of vinyl siding materials. It is important to distinguish the performance characteristics of insulated and backed sidings. Backed Siding, a new category with foam backing, differs by not providing continuous exterior insulation.

Additional cost to construction:

The materials will add 25% to 50% additional cost if chosen. However, their use is not obligatory.

Modification S12047: Requires monitoring of existing structures adjacent to new construction for vibration-induced stresses.

3307.3 Vibrations. Vibrations generated from permitted construction or demolition shall be monitored and controlled by the project's engineer of record for the effects on neighboring buildings. Construction vibrations generated from pile driving, deep foundations, or other construction or demolition activities shall be limited to a peak particle velocity of 0.5 inches per second.

Information provided by the proponent:

The effects of construction or demolition vibration are an ongoing concern for safety and comfort in occupied neighboring buildings. Following the collapse of the Champlain Towers South structure, some initial concerns centered around the vibration that was experienced by the collapsed building during the construction of the adjacent condominium structure to the south. In the building environment, with new high-rise structures being built next to existing buildings and demolition of structures to make way for new buildings, existing structures may be subject to vibration-induced stresses from excavation, demolition, and construction activities

Additional cost to construction: Minimal.

Modification S12161: This proposal adds a new section to the code and is based on the corrosion resistance requirements in ICC 600-2020.

1711 CORROSION RESISTANCE - SALTWATER ENVIRONMENTS

1711.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 ft (914 m) of a saltwater coastline shall comply with Section 1711.1.1 and 1711.1.2.

Exception: Fasteners and connectors fully embedded in concrete or mortar.

1711.1.1 Screws, bolts and nails. Screws, bolts and nails shall be corrosion resistant by composition (stainless steel or nonferrous metal) or by coating or galvanization as specified in this section and Table 1711.1.

1711.1.1.1 Stainless steel. Where required by Table R306.1, fasteners shall be manufactured from ASTM A240 Type 304, Type A305 or Type 316 stainless steel.

1711.1.1.2 Galvanized. Where required by Table 1711.1, fasteners shall be in accordance with the following:

1. For fasteners with diameters greater than 3/8 inch (9.5 mm), the minimum corrosion resistance shall comply with or be equivalent to ASTM A153, Class C.

2. For fasteners with diameters 3/8 inch (9.5 mm) and less, the minimum corrosion resistance shall comply with or be equivalent to one of the following methods:

2.1. ASTM A153, Class D.

2.2. ASTM A641, Class 3S.

2.3. Corrosion resistance exhibiting not more than 5 percent red rust after 1,000 hours of exposure in accordance with ASTM B117.

2.4. Corrosion resistance exhibiting not more the 5 percent red rust after 280 hours of exposure for nails, 1000 hours of exposure for roof tile fasteners or 360 hours of exposure for other carbon steel fasteners in accordance with ASTM G85, Annex 5.

1711.1.1.3 Compatibility. Fasteners used with connectors or other metal plates shall have a corrosion-resistant coating or composition that is compatible with the corrosion-resistant coating or composition of the connectors to prevent corrosion from galvanic action between dissimilar materials.

1711.1.2 Connectors and metal plates. Connectors and metal plates shall be corrosion resistant by composition

(stainless steel or nonferrous metal) or by coating or galvanization as specified in this section and Table 1711.1.

1711.1.2.1 Stainless steel. Where required by Table 1711.1, connectors and metal plates shall be manufactured from ASTM A240 Type 316 stainless steel.

1711.1.2.2 Enhanced galvanizing. Where required by Table 1711.1, connectors and metal plates shall be in accordance with one of the following:

1. Hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G185.
2. Hot-dipped galvanized after fabrication to meet ASTM A123 providing a minimum average coating weight of 2.0 oz./ft² (total both sides).
3. Provided with a protective coating as specified by TPI 1.

1711.1.2.3 Standard Galvanizing. Where required by Table 1711.1, connectors and metal plates shall be in accordance with one of the following:

1. Hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G90.
2. Hot-dipped galvanized after fabrication to meet ASTM A123 providing a minimum average coating weight of 2.0 oz./ft² (total both sides).
3. Provided with a protective coating as specified by TPI 1.

TABLE 1711.1

CORROSION RESISTANCE OF FASTENERS AND CONNECTORS

<u>Exposure Description^a</u>	<u>Building Location</u>			
	<u>Less than or equal to 300 feet from coastal shoreline</u>		<u>Greater than 300 feet and up to 3000 feet from coastal shoreline</u>	
	<u>Screws, bolts, lag screws (including nuts and washers), nails and glulam rivets</u>	<u>Connectors and Metal Plates</u>	<u>Screws, bolts, lag screws (including nuts and washers), nails and glulam rivets</u>	<u>Connectors and Metal Plates</u>
<u>Exterior-Partially Sheltered and Exterior-Open Exposed</u>	<u>Stainless Steel in accordance with Section 1711.1.1.1</u>	<u>Stainless Steel in accordance with Section 1711.1.2.1</u>	<u>Galvanized in accordance with Section 1711.1.1.2</u>	<u>Enhanced Galvanized in accordance with Section 1711.1.2.2</u>
<u>Unconditioned Interior-Vented Enclosed</u>	<u>Galvanized in accordance with Section 1711.1.1.2</u>	<u>Enhanced Galvanized in accordance</u>	<u>Galvanized in accordance with</u>	<u>Enhanced Galvanized in accordance</u>

		with Section 1711.1.2.2	Section 1711.1.1.2	with Section 1711.1.2.2
<u>Unconditioned Interior-Unvented Enclosed</u>	<u>Galvanized in accordance with Section 1711.1.1.2</u>	<u>Standard Galvanized in accordance with Section 1711.1.2.3</u>	<u>Galvanized in accordance with Section 1711.1.1.2</u>	<u>Standard Galvanized in accordance with Section 1711.1.2.3</u>

Exposure Descriptions:

Exterior-Partially Sheltered locations are areas where fasteners and connectors are exposed to salt air, but not exposed to fresh rainwater to remove accumulated salt. **Exterior-Open Exposed locations** are areas where fasteners and connectors are exposed to salt air, but also exposed to rainwater to allow rinsing of the accumulated salt, and also more likely to dry after rain.

Unconditioned Interior-Vented Enclosed locations are those where fasteners and connectors inside a part of the building that also has vents to the outside environment that would allow salt air to enter.

Unconditioned Interior-Unvented Enclosed locations are those that are inside the building, but not in the conditioned space.

Information provided by the proponent:

This proposal is submitted on behalf of the Insurance Institute for Business and Home Safety (IBHS). Post-disaster assessments conducted by IBHS and other entities on wood-framed buildings acted by natural hazards, such as high winds, floods, and earthquakes, have consistently shown that structural failures often occur at connections rather than in the framing members. In coastal areas, where higher moisture and humidity levels exist and buildings are exposed to salt spray, corroded metal connectors and fasteners have been observed to contribute to the loss of an adequate load path. The loss of an adequate load path often results in damage to or failure of the structure. This proposal is based on the corrosion resistance requirements in ICC 600-2020. While ICC 600-2020 is referenced in Section 1609.1.1, it is not required by the code and therefore not mandatory for buildings. Research has shown that fasteners and connectors near the coastline exhibit corrosion where they are readily exposed to salt air and humidity, particularly if they are in a partially sheltered location where the salt is not washed by rain. While the proposed table is adapted from ICC 600-2020 Section 505.3, the ICC 600 requirements and this proposal are based on the recommendations in the FEMA NFIP Technical Bulletin (TB) 8, Corrosion Protection for Metal Connectors and Fasteners in Coastal Areas in Accordance with the National Flood Insurance Program (June 2019). TB 8 can be viewed and downloaded at https://www.fema.gov/sites/default/files/2020-07/tb8_corrosion_protection_metal_connectors_coastal_areas.pdf. Metal connectors and fasteners are important elements in transferring loads from natural hazards (e.g., flood, wind, seismic) through a building. Corrosion rates for metal are dramatically higher in coastal environments than in less harsh, non-coastal environments. Therefore, it is important to increase the corrosion protection for metal connectors and fasteners in coastal environments. Studies have shown that stainless steel and thick hot-dip galvanized (G185 or higher) metal connectors and fasteners improve corrosion protection.

Additional cost to construction:

Slight increase in construction cost during the construction time.

Modification SW12012: Requires underwater lights on new residential pools to be low voltage.

454.2.16.1 Voltage Limitation. Underwater lighting, or lighting that may be exposed to nozzle-directed pool water, shall not exceed 30 volts DC or 15 volts AC. Such lights shall be installed in accordance with manufacturer's installation instructions and be listed by a nationally recognized testing laboratory.

Information provided by the proponent:

All underwater lights should be low voltage to reduce the possibility of electrical hazards in swimming pools and spas. Commercial swimming pools and spas have been successfully using low voltage lights for years.

Additional cost to construction:

Minimal, there is a slight increase in cost for light components but this will be offset with longer service LED lights now mandated under Federal rules.

Florida Building Code, Energy Conservation

Modification EN11711: Section R403.5.3 of the FECC is shown as Prescriptive only and does not specifically require the insulation of recirculation system piping mains. Adding a mandatory requirement to section R403.5.1.1 for R-3 insulation to recirculation systems saves energy and clears up the confusion.

R403.5.1.1 Circulation systems.

Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermosyphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water. Supply and return piping mains in circulation and recirculation systems other than cold water pipe demand recirculation systems shall have a minimum 1/2 " thickness insulation.

Information provided by the proponent:

Section R403.5.3 of the FECC is shown as Prescriptive only and does not specifically require the insulation of recirculation system piping mains. It is also not referenced in the FBCR and only R403.5.1. is referenced for controls. I have received many questions about whether insulation is required using the Performance method. The IRC requires insulation on recirculation system mains, but the FBCR does not when the performance method is used. Many times, a recirculation system is not even shown on a 405 Performance calculation leaving it confusing to the inspector. To save energy, hot water recirculating piping mains should be insulated and mandatory for all compliance methods. Most contractors already insulate recirculation system mains to prevent heat loss because they mistakenly believe it is a mandatory requirement because of the confusion between the IRC, the IECC, and the Florida Energy Conservation Code. R-3 insulation is inexpensive. This section does not require branch lines to be insulated because of space constraint issues in walls and leaves it up to the contractors' discretion to insulate branch lines. Adding a mandatory requirement to section R403.5.1.1 for R-3 insulation to recirculation systems saves energy and clears up the confusion

Additional cost to construction:

This modification will clear up confusion by inspectors because of the difference between the International and the Florida Energy Code. The cost will be minimal because most contractors already insulate recirculation system by piping mains. Cost of the insulation is about \$3.50 for a 6-foot length of R-3 insulation. It is easy to install when the pipe is installed.

Modification EN12140: Applies consistent air leakage test requirement across all compliance paths.

Revise Section R403.3.3 as follows:

R403.3.3 Duct testing (Mandatory).

Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All registers shall be taped or otherwise sealed during the test.
2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handle enclosure. Registers shall be taped or otherwise sealed during the test.

Exceptions:

4. A duct leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.
2. ~~Duct testing is not mandatory for buildings complying by Section R405 of this code. Duct leakage testing is required for Section R405 compliance where credit is taken for leakage, and a duct air leakage Q_n to the outside of less than 0.080 (where Q_n = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is indicated in the compliance report for the *proposed design*.~~

A written report of the results of the test shall be signed by the party conducting the test and provided to the code *official*.

Strike Section R405.2.3:

~~R405.2.3 Duct air leakage testing.~~

~~In cases where duct air leakage lower than the default Q_n to outside of 0.080 (where Q_n = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is specified for the *proposed design*, testing in accordance with Section R403.3.2 shall verify a duct air leakage rate not exceeding the leakage rate of the *proposed design*. Otherwise, in accordance with Section R403.3.3, duct testing is not mandatory for buildings complying by Section R405.~~

Revise Table R405.5.2(1) as follows:

TABLE R405.5.2(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	Distribution system efficiency: 0.88	Thermal distribution system efficiency shall be <u>as tested in accordance with ANSI/RESNET/ICC 380, or if not tested per testing exception in Section R403.3.3, shall be modeled as a Q_n to outside of 0.060 for ducted systems.</u> or if not tested, shall be modeled as a Q_n to outside of 0.080 for ducted systems.

		<u>Hydronic and ductless systems shall be as specified in Table R405.5.2(2). Hydronic and ductless systems shall be as specified in Table R405.5.2(2) if not tested.</u>
	Duct location: entirely within the building thermal envelope	As proposed, <u>except if located in unvented attic with insulation at the roof deck, the location shall be the attic.</u>
	Air handler location: entirely within the building thermal envelope	As proposed, <u>except if located in unvented attic with insulation at the roof deck, the location shall be the attic.</u>
	Duct insulation: R-6	As proposed

Information provided by the proponent:

The intent of this proposal is to require most new homes to be tested for duct leakage, consistent with every edition of the IECC since 2009. This proposal would remove the exception contained in the 2023 Florida Building Code, Energy Conservation, Eighth Edition that allows buildings certified under the simulated performance alternative to avoid duct testing. Duct testing will promote proper HVAC system operation and longevity by helping ensure that conditioned air reaches the intended spaces. Duct testing is particularly important for air handlers located in attics to ensure that conditioned air is not simply leaking into the attic. This proposal will reduce energy costs, increase occupant comfort and indoor air quality, and prevent unnecessary strain on heating and cooling systems.

Additional cost to construction:

The proposal may increase costs by requiring envelope leakage test but will yield efficiency and indoor air quality improvements for many years.

Modification EN12314: Additional energy efficiency credit requirements for Prescriptive compliance.

Revise as follows:

R401.2 Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404 and Section R407.
2. Section R405 and the provisions of Sections R401 through R404 labeled "Mandatory."
3. An energy rating index (ERI) approach in Section R406.

[New Section R407]

SECTION R407

ADDITIONAL EFFICIENCY REQUIREMENTS

R407.1 Scope. This section provides additional efficiency measures and credits required to comply with **Section R401.2** Item 1.

R407.2 Additional energy efficiency credit requirements. Residential buildings shall earn not less than 10 credits from not less than two measures specified in Table R407.2. Five additional credits shall be earned for dwelling units with more than 5,000 square feet (465 m²) of living space located above grade plane. To earn credit as specified in Table R407.2 for the applicable climate zone, each measure selected for compliance shall comply with the applicable subsections of Section R407. Each dwelling unit or sleeping unit shall comply with the selected measure to earn credit. Interpolation of credits between measures shall not be permitted.

TABLE R407.2—CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

<u>MEASURE NUMBER</u>	<u>MEASURE DESCRIPTION</u>	<u>Climate Zone 1</u>	<u>Climate Zone 2</u>
<u>.1.1(1)</u> R407.2	<u>> 10% reduction in total UA</u>	<u>1</u>	<u>1</u>
<u>.1.1(2)</u> R407.2	<u>> 20% reduction in total UA</u>	<u>2</u>	<u>4</u>
<u>.1.2</u> R407.2	<u>U-factor and SHGC for vertical fenestration per Table R407.2.1.2</u>	<u>1</u>	<u>1</u>
<u>.1.3</u> R407.2	<u>Roof solar reflectance index (roof is above an unconditioned space connected to conditioned space or above a conditioned space)</u>	<u>5</u>	<u>5</u>
<u>.2(1)^a</u> R407.2	<u>High Performance Cooling with electric resistance heating</u>	<u>5</u>	<u>N</u> <u>/A</u>
<u>.2(2)^a</u> R407.2	<u>High Performance Gas furnace and cooling</u>	<u>5</u>	<u>5</u>
<u>.2(3)^a</u> R407.2	<u>High Performance Heat pump (Option 1: 15.2 SEER2 / 7.8 HSPF2)</u>	<u>6</u>	<u>4</u>
<u>.2(4)^a</u> R407.2	<u>High Performance Heat pump (Option 2: 16.5 SEER2 / 8.2 HSPF2)</u>	<u>9</u>	<u>9</u>
<u>.3(1 or 2)^c</u> R407.2	<u>Efficient water heating</u>	<u>6</u>	<u>6</u>
<u>.3(3)</u> R407.2	<u>Efficient heat pump water heater exhausted to conditioned space</u>	<u>9</u>	<u>9</u>
<u>.3(4)(a)^c</u> R407.2	<u>Solar hot water heating system (Option 1)</u>	<u>13</u>	<u>1</u> <u>3</u>
<u>.3(4)(b)^c</u> R407.2	<u>Solar hot water heating system (Option 2)</u>	<u>10</u>	<u>9</u>
<u>.3.1^b</u> R407.2	<u>Compact hot water distribution</u>	<u>2</u>	<u>2</u>
<u>.4(1)^b</u> R407.2	<u>Ductless or hydronic thermal distribution</u>	<u>3</u>	<u>4</u>
<u>.4(2)^b</u> R407.2	<u>≥ 80% of ductwork inside conditioned space</u>	<u>2</u>	<u>3</u>
<u>.5</u> R407.2	<u>Renewable energy measures</u>	<u>17</u>	<u>1</u> <u>6</u>
<u>.6^b</u> R407.2	<u>Demand responsive thermostat</u>	<u>1</u>	<u>1</u>
<u>.7</u> R407.2	<u>Whole-home lighting control</u>	<u>1</u>	<u>1</u>

a. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

b. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

c. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

R407.2.1 Enhanced building thermal envelope options. The building thermal envelope shall comply with one or more of the following:

1. Section R407.2.1.1 or R407.2.1.2. Credit shall be permitted from only one measure.
2. Section R407.2.1.3.
3. Section R407.2.1.4.

R407.2.1.1 Enhanced building thermal envelope performance. The total building thermal envelope UA shall be calculated for the proposed building in accordance with Section R402.1.5 and shall be reduced by not less than the percentage indicated in Table R407.2 in comparison to the reference building.

R407.2.1.2 Improved fenestration. The area weighted average U-factor and SHGC of all vertical fenestration shall be equal to or less than the values specified in Table R407.2.1.2.

TABLE R407.2.1.2—IMPROVED FENESTRATION		
CLIMATE ZONE	U-FACTOR	SHGC
1	0.32	0.23
2	0.30	0.23

R407.2.1.3 Roof solar reflectance index. Residential roofs shall earn credit for Table R407.2 measure number R407.2.1.3 where the 3-year-aged solar reflectance index (SRI) is greater than or equal to 50. To earn credit, not less than 90 percent of the roof area shall comply.

The 3-year-aged SRI shall be determined in accordance with ASTM E1980 using a convection coefficient of 2.1 Btu/h × ft² × °F (12 W/m² × K). Calculation of aged SRI shall be based on 3-year-aged solar reflectance values tested in accordance with ASTM C1549, ASTM E903, ASTM E1918 or CRRC S100 and 3-year-aged thermal emittance values tested in accordance with ASTM C1371, ASTM E408 or CRRC S100.

R407.2.1.3.1 Aged solar reflectance. Where a tested 3-year-aged solar reflectance value is not available, an assigned value shall be determined in accordance with Equation 4-1.

$$\text{Equation 4-1 } R_{\text{aged}} = [0.2 + 0.7(R_{\text{initial}} - 0.2)]$$

where:

R_{aged} = The aged solar reflectance.

R_{initial} = The initial solar reflectance determined in accordance with ASTM C1549, ASTM E903, ASTM E1918 or CRRC S100.

R407.2.2 More efficient HVAC equipment performance options. Heating and cooling equipment shall meet one of the following measures as applicable for the climate zone where heating and cooling efficiencies are represented by Annual Fuel Utilization Efficiency (AFUE), Coefficient of Performance (COP), Energy Efficiency Ratio (EER and EER2), Heating Season Performance Factor (HSPF2) and Seasonal Energy Efficiency Ratio

(SEER2). Where multiple heating or cooling systems are installed serving different zones, credits shall be earned based on the weighted average of square footage of the zone served by the system.

1. Cooling: Greater than or equal to 15.2 SEER2 air conditioner with electric resistance heating.
2. Gas furnace and cooling: Greater than or equal to 90 percent AFUE *fuel* gas furnace and 15.2 SEER2 air conditioner.
3. Heat pump (Option 1): Greater than or equal to 7.8 HSPF2, 15.2 SEER2 air source heat pump.
4. Heat pump (Option 2): Greater than or equal to 8.2 HSPF2, 16.5 SEER2 air source heat pump.

R407.2.3 Reduced energy use in service water-heating options. For measure numbers R407.2.3(1) through R407.2.3(3), the installed hot water system shall meet one of the Uniform Energy Factors (UEF) in Table R407.2.3. For measure number 407.2.3(4) the installed hot water system shall meet the appropriate Solar Uniform Energy Factor (SUEF) in Table R407.2.3. For measure number R407.2.3.1, the hot water distribution system shall comply with Section R407.2.3.1.

TABLE R407.2.3—SERVICE WATER HEATING EFFICIENCIES				
M EASURE NUMBER	WATER HEATER	SIZE AND DRAW PATTERN	TYP E	EF FICIENCY
R 407.2.3(1))	Gas-fired instantaneous water heaters	All storage volumes, medium or high	=	U EF ≥ 0.86
R 407.2.3(2))	Electric water heaters	All storage volumes, low, medium, or high	HP WH	U EF ≥ 3.0
R 407.2.3(3))	Electric water heaters	All storage volumes, low, medium, or high	HP WH exhausted to conditioned space	U EF ≥ 3.0
R 407.2.3(4)) (a)	Solar water heaters (Option 1)	All storage volumes, all draw patterns	Elec tric backup	S UEF ≥ 3.00
R 407.2.3(4)) (b)	Solar water heaters (Option 2)	All storage volumes, all draw patterns	Gas backup	S UEF ≥ 1.80
For SI: 1 British thermal unit per hour = 0.2931 W.				
UEF = Uniform Energy Factor, E _t = Thermal Efficiency, COP = Coefficient of Performance.				

R407.2.3.1 Compact hot water distribution system option. The pipe shall store not more than 16 ounces (0.47 L) of water between the nearest source of heated water and the termination of the fixture supply pipe when calculated using Section R407.2.3.1.1. Where the source of heated water is a circulation loop, the loop shall be primed with a *demand recirculation water system* that complies with Section R403.5.2. There shall be a dedicated return line for the loop that begins after the branch to the last fixture on the supply portion of the loop and runs back to the water heater.

TABLE R407.2.3.1—INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION TUBING

OUNCES OF WATER PER FOOT OF TUBE									
Nominal Size (inches)	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVCSC H 40	CPVCSC H 80	PE-RT SDR 9	Composite ASTM F1281	PEX CTS SDR 9
3/8	1.06	0.97	0.84	N/A	1.17	—	0.64	0.63	0.64
1/2	1.69	1.55	1.45	1.25	1.89	1.46	1.18	1.31	1.18
3/4	3.43	3.22	2.90	2.67	3.38	2.74	2.35	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	4.57	3.91	5.56	3.91
1 1/4	8.70	8.36	8.09	6.61	9.66	8.24	5.81	8.49	5.81
1 1/2	12.18	11.83	11.45	9.22	13.20	11.38	8.09	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	19.11	13.86	21.48	13.86

For SI: 1 foot = 304.8 mm, 1 inch = 25.4 mm, 1 liquid ounce = 0.030 L, 1 ounce per square foot = 305.15 g/m².

N/A = Not Available.

R407.2.3.1.1 Water volume determination. The water volume in the piping between a source of heated water and the termination of a fixture supply shall be calculated in accordance with this section. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered to be sources of heated water. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from Table R407.2.3.1. The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

R407.2.4 More efficient thermal distribution system options. The thermal distribution system shall comply with one of the following:

1. The ductless thermal distribution system or hydronic thermal distribution system is located completely on the conditioned side of the *building thermal envelope*.
2. The *space conditioning equipment* is located inside *conditioned space* and not less than 80 percent of *ductwork* is located completely inside *conditioned space*.

R407.2.5 Renewable energy. *Renewable energy resources* shall be permanently installed and have the rated capacity to produce not less than the wattage of *renewable energy per square foot of conditioned floor area* indicated in Table R407.2.5. Off-site renewable energy shall meet all the requirements of Sections R407.2.5.1 through R407.2.5.3.

Table R407.2.5 ON-SITE AND OFF-SITE RENEWABLE ENERGY PROCUREMENT REQUIREMENTS

<u>LOCATION</u>	<u>REQUIRED RATED PROCURED WATTS PER CONDITIONED SQUARE FOOT OF DWELLING UNIT</u>
<u>On-site Renewable Energy System</u>	<u>1.00</u>
<u>Off- site Procurement</u>	<u>1.33</u>

R407.2.5.1 Off-Site Procurement.

The building owner shall procure and be credited for the total amount of off-site renewable energy procured by one of the following sources:

1. Community renewable energy facility.
2. Renewable energy power purchase agreement.
3. Direct ownership.
4. Renewable energy investment fund.
5. Green retail pricing.
6. The energy source shall produce electricity from solar or wind energy.

Exceptions:

1. Captured methane from feed lots and landfills are permitted to be used to generate electricity for the purposes of this section.
2. Hydropower from new generation capacity on a non-impoundment or new generation capacity on an existing impoundment that meets one of the following conditions:
 1. The hydropower facility complies with the Low Impact Hydropower Certification Handbook and is certified by a nationally recognized accreditation organization.
 2. The hydropower facility complies with UL 2854 and is certified by an organization that has the standard in its ISO/IEC 17065 scope of accreditation.
 3. The hydropower facility consists of a turbine in a pipeline or a turbine in an irrigation canal.

For facilities falling under these exceptions, only output generated during the period of certification is eligible for RECs sale in accordance with the provisions of this section. Renewables from new impoundments of water are not eligible.

R407.2.5.1.1 The generation source shall be located where the energy can be delivered to the building site by any of the following:

1. Direct connection to the off-site renewable energy facility.
2. The local utility or distribution entity.
3. An interconnected electrical network where energy delivery capacity between the generator and the building site is available. (Informative Note: Examples of interconnected electrical networks include regional power pools and regions served by independent system operators or regional transmission organizations.)

R407.2.5.2 Off-Site Contract.

The renewable energy shall be delivered or credited to the site of the building under an energy contract duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property. The total required off-site renewable energy shall be procured in equal installments over the duration of the off-site contract.

R407.2.5.3 Renewable Energy Certificate (REC) Documentation.

The property owner or owner's authorized agent shall demonstrate that where RECs are associated with off-site renewable energy production required by Sections R407.2.5.1 through R407.2.5.3, the following criteria shall be met:

1. The RECs shall be retained and retired by or on behalf of the property owner or tenant for a period of not less than 15 years or the duration of the contract in Section R407.2.5.2, whichever is less.
2. The RECs shall be created within a 12-month period of the use of the REC.
3. The RECs represent a generating asset constructed not more than 5 years before the issuance of the certificate of occupancy.

R407.2.6 Demand response. The *thermostat* controlling the primary heating or cooling system of each *dwelling unit* shall be provided with a *demand responsive control* capable of communicating with the Virtual End Node (VEN) using a wired or wireless bi-directional communication pathway that provides the occupant the ability to voluntarily participate in utility demand response programs, where available. The *thermostat* shall be capable of executing the following actions in response to a *demand response signal*:

1. Automatically increasing the zone operating cooling set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C) and 4°F (2°C).
2. Automatically decreasing the zone operating heating set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C) and 4°F (2°C).

Thermostats controlling single-stage HVAC systems shall comply with Section R407.2.8.1. Thermostats controlling variable capacity systems shall comply with Section R407.2.8.2. Thermostats controlling multistage HVAC systems shall comply with either Section R407.2.8.1 or R407.2.8.2. Where a *demand response signal* is not available, the *thermostat* shall be capable of performing all other functions.

R407.2.6.1 Single-stage HVAC system controls. Thermostats controlling single-stage HVAC systems shall be provided with a *demand responsive control* that complies with one of the following:

1. Certified OpenADR 2.0a VEN, as specified under Clause 11, Conformance.
2. Certified OpenADR 2.0b VEN, as specified under Clause 11, Conformance.
3. Certified by the manufacturer as being capable of responding to a *demand response signal* from a certified OpenADR 2.0b VEN by automatically implementing the control functions requested by the VEN for the equipment it controls.
4. IEC 62746-10-1.
5. The communication protocol required by a controlling entity, such as a utility or service provider, to participate in an automated demand response program.
6. The physical configuration and communication protocol of CTA 2045-A or CTA-2045-B.

R407.2.6.2 Variable-capacity and two-stage HVAC system controls. Thermostats controlling variable-capacity and two-stage HVAC systems shall be provided with a *demand responsive control* that complies with the communication and performance requirements of AHRI 1380.

R407.2.7 Whole-home lighting control. The *dwelling unit* shall have a *manual* control by the main entrance that turns off all the permanently installed interior lighting or a lighting control system that has the capability to turn off all permanently installed interior lighting from remote locations.

2. Exceptions:

1. Up to 5 percent of the total lighting power may remain uncontrolled.
2. Spaces where lighting is controlled by a count-down timer or *occupant sensor control*.

Information provided by the proponent:

Help maintain 2024 IECC Prescriptive compliance stringency level for Florida code. This mod includes abridged, Florida applicable portions of 2024 IECC Section R408, and is submitted as a starting point; additional modifications may be made to simplify and further make section applicable to Florida.

Additional cost to construction:

Increase cost of construction. However, one or more of these efficiency options should be cost effective. See cost effectiveness analysis starting on page 24 of https://www.floridabuilding.org/fbc/commission/FBC_0125/Energy_TAC/Residential-2024-IECC-vs-2023-FBC-EC_Code_Review.pdf

Modification EN12305: Delete and Replace Section C406 from FBC-EC 2023 with Section C406 in IECC-2024.

DELETE and substitute Section C406

~~SECTION C406~~

~~ADDITIONAL EFFICIENCY PACKAGE OPTIONS~~

~~C406.1 Requirements.~~ Buildings shall comply with at least one of the following:

- ~~1. More efficient HVAC performance in accordance with Section C406.2.~~
- ~~2. Reduced lighting power density system in accordance with Section C406.3.~~
- ~~3. Enhanced lighting controls in accordance with Section C406.4.~~
- ~~4. On-site supply of renewable energy in accordance with Section C406.5.~~
- ~~5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.~~
- ~~6. High efficiency service water heating in accordance with Section C406.7.~~

~~C406.1.1 Tenant spaces.~~ Tenant spaces shall comply with Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively,

~~tenant spaces shall comply with Section C406.5 where the entire building is in compliance.~~

~~Exception:~~ Previously occupied tenant spaces that comply with this code in accordance with Section C501. (EN8148)

~~C406.2 More efficient HVAC equipment performance.~~

~~Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through C403.2.3(7) by 10~~

~~percent, in addition to the requirements of Section C403.~~

~~Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. Variable~~

~~refrigerant flow systems shall exceed the energy efficiency provisions of ANSI/ASHRAE/IESNA 90.1 by 10~~

percent. Equipment not listed in Tables C403.2.3(1) through C403.2.3(7) shall be limited to 10 percent of the total building system capacity.

C406.3 Reduced lighting power density. The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values specified in Table C405.3.2(1) times the floor area for the building types, or by using 90 percent of the interior lighting power allowance calculated by the Space-by-Space Method in Section C405.3.2.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls that shall be located, scheduled and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of not more than four luminaires shall be allowed.
3. Not more than eight luminaires shall be controlled together in a *daylight zone*.
4. Fixtures shall be controlled through a digital control system that includes the following function:
 - 4.1. Control reconfiguration based on digital addressability.
 - 4.2. Load shedding.
- 4.3. Individual user control of overhead general illumination in open offices.
- 4.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of this section.
6. Functional testing of lighting controls shall comply with Section C408.

C406.5 On-site renewable energy. The total minimum ratings of on-site renewable energy systems shall be one of the following:

1. Not less than 1.71 Btu/h per square foot (5.4 W/m²) or 0.50 watts per square foot (5.4 W/m²) of conditioned floor area.
2. Not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4.

C406.6 Dedicated outdoor air system. Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide not less than the minimum 100 percent outdoor air to each individual occupied space, as specified by the *Florida Building Code, Mechanical*. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply air temperature controls that automatically reset the supply air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply air temperature at least 25 percent of the difference between the design supply air temperature and the design room air temperature.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1: Boarding houses, hotels or motels.
2. Group I-2: Hospitals, psychiatric hospitals and nursing homes.
3. Group A-2: Restaurants and banquet halls or buildings containing food preparation areas.
4. Group F: Laundries.

~~5. Group R-2: Buildings with residential occupancies.~~

~~6. Group A-3: Health clubs and spas.~~

~~7. Buildings showing a service hot water load of 10 percent or more of total building energy loads, as shown with an energy analysis as described in Section C407.~~

C406.7.1 Load fraction. ~~The building service water heating system shall have one or more of the following that are sized to provide not less than 60 percent of the building's annual hot water requirements, or sized to provide 100 percent of the building's annual hot water requirements if the building shall otherwise comply with Section C403.4.5.~~

~~1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, or process equipment, or a combined heat and power system.~~

~~2. Solar on-site renewable energy water heating systems~~

SECTION C406—ADDITIONAL EFFICIENCY, RENEWABLE AND LOAD MANAGEMENT REQUIREMENTS

C406.1 Compliance. Buildings shall comply as follows:

1. Buildings with greater than 2,000 square feet (186 m²) of conditioned floor area shall comply with Section C406.1.1.
2. Buildings with greater than 5,000 square feet (465 m²) of conditioned floor area shall comply with Sections C406.1.1 and C406.1.2.
3. Build-out construction greater than 1,000 square feet (93 m²) of conditioned floor area that does not have final lighting or final HVAC systems installed under a prior building permit shall comply with Section C406.1.1.2.

Exceptions: Core and shell buildings where not less than 20 percent of the net floor area is without final lighting or final HVAC that comply with all of the following:

1. Buildings with greater than 5,000 square feet (465 m²) of conditioned floor area shall comply with Section C406.1.2.
2. Portions of the building where the net floor area is without final lighting or final HVAC shall comply with Section C406.1.1.2.
3. Portions of the building where the net floor area has final lighting and final HVAC systems shall comply with Section C406.1.1.

C406.1.1 Additional energy efficiency credit requirements. Buildings shall comply with measures from Section C406.2 to achieve not less than the number of required efficiency credits from Table C406.1.1(1) based on building occupancy group and climate zone. Where a project contains multiple occupancies, the total required energy credits from each building occupancy shall be weighted by the gross conditioned floor area to determine the weighted-average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for the purposes of Section C406.

Exceptions:

1. Portions of buildings devoted to manufacturing or industrial use.
2. Where a building achieves more renewable and load management credits in Section C406.3 than are required in Section C406.1.2, surplus credits shall be permitted to reduce the required energy efficiency credits as follows:

Equation 4-12 $EEC_{red} = EEC_{tbl} - \{ \text{the lesser of: } [SLRM_{lim} \cdot SRLM_{adj} \times (RLM_{ach} - RLM_{req})] \}$ where:

EEC_{red} = Reduced required energy efficiency credits.

EEC_{tbl} = Required energy efficiency credits from Table C406.1.1(1).

$SLRM_{lim}$ = Surplus renewable and load management credit limit from Table C406.1.1(2).

$SRLM_{adj}$ = 1.0 for all-electric or all-renewable buildings (excluding emergency generation); 0.7 for buildings with fossil fuel equipment (excluding emergency generation).

RLM_{ach} = Achieved renewable and load management credits from Section C406.3.

RLM_{req} = Required renewable and load management credits from Section C406.1.2.

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP																			
BUILDING OCCUPANCY GROUP	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 and I-1	65	66	67	77	80	86	80	81	90	86	90	90	86	90	90	70	89	80	78
I-2	43	42	38	37	36	38	32	32	30	36	36	35	43	43	44	46	47	50	53
R-1	63	62	66	65	70	71	77	80	84	81	83	88	85	86	90	83	87	87	85
B	62	62	64	66	66	65	64	64	68	70	72	74	71	73	77	71	74	74	71
A-2	70	70	72	72	75	75	70	73	82	69	74	78	67	72	78	60	67	57	51
M	80	79	83	79	81	84	67	74	87	80	66	65	79	62	50	75	67	75	58
E	56	57	55	58	58	57	59	62	59	61	66	62	64	67	67	65	67	63	58
S-1 and S-2	61	60	61	60	58	57	44	54	62	85	68	75	90	82	72	90	89	90	90
All other	31	31	31	32	32	33	30	32	36	35	35	35	37	36	36	36	37	36	34

TABLE C406.1.1(2)—LIMIT TO ENERGY EFFICIENCY CREDIT CARRYOVER FROM RENEWABLE AND LOAD MANAGEMENT CREDITS

BUILDING OCCUPANCY GROUP	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 and I-1	5	5	5	5	5	5	5	24	19	5	22	18	5	5	19	5	5	5	5
I-2	16	14	11	8	6	5	5	10	6	8	14	10	17	26	29	21	21	22	39
R-1	7	5	8	5	19	5	32	40	41	24	41	42	17	37	41	5	24	15	22
B	7	5	5	8	6	6	14	26	31	23	39	34	19	35	45	5	19	17	27
A-2	18	16	14	15	13	9	11	23	32	5	23	23	5	5	26	5	5	5	5
M	5	5	5	5	5	5	5	5	20	5	5	5	5	5	5	5	5	5	5
E	13	13	18	16	17	14	21	35	40	25	43	29	23	32	27	11	17	25	5
S-1 and S-2	5	5	5	5	5	5	5	5	13	5	17	20	5	35	23	5	5	11	40
All other	5	5	5	5	5	5	5	7	17	5	10	7	5	6	11	5	5	5	5

C406.1.1.1 Reserved.

C406.1.1.2 Building core/shell and build-out construction. Where separate permits are issued for core and shell *buildings* and build-out construction, compliance shall be in accordance with the following requirements.

1. Core and shell *buildings* or portions of *buildings* shall comply with one of the following:
 - 1.1. Where the permit includes a central HVAC system or *service water heating* system with chillers, heat pumps, boilers, *service water heating* equipment or loop pumping systems with heat rejection, the project shall achieve not less than 50 percent of the energy credits required by Section C406.1.1 in accordance with Section C406.2.
 - 1.2. Alternatively, the project shall achieve not less than 33 percent of the energy credits required by Section C406.1.1.
2. For core and shell buildings or portions of *buildings*, the energy credits achieved shall be subject to the following adjustments:
 - 2.1. Lighting measure credits shall be determined only for areas with final lighting installed.
 - 2.2. Where HVAC or *service water heating* systems are designed to serve the entire *building*, full HVAC or *service water heating* measure credits shall be achieved.
 - 2.3. Where HVAC or *service water heating* systems are designed to serve individual areas, HVAC or *service water heating* measure credits achieved shall be reduced in proportion to the floor area with final HVAC systems or final *service water heating* systems installed.
3. Build-out construction shall be deemed to comply with Section C406.1 where one of the following applies:
 - 3.1. Where heating and cooling generation is provided by a previously installed central system, the energy credits achieved in accordance with Section C406.2 under the build-out project are not less than 33 percent of the credits required by Section C406.1.1.
 - 3.2. Where heating and cooling generation is provided by an HVAC system installed in the build-out, the energy credits achieved in accordance with Section C406.2 under the build-out project are not less than 50 percent of the credits required by Section C406.1.1.
 - 3.3. Where the core and shell *building* is approved in accordance with Section C407 under the 2023 *Florida Building Code, Energy Conservation* or later.

C406.1.2 Additional renewable and load management credit requirements. *Buildings* shall comply with measures from Section C406.3 to achieve not less than the number of required renewable and load management credits from Table C406.1.2 based on building occupancy group and *climate zone*. Where a project contains multiple occupancies, credits in Table C406.1.2 from each building occupancy shall be weighted by the gross floor area to determine the weighted-average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for the purposes of Section C406.

Exception: Where a *building* achieves more energy efficiency credits in Section C406.2 than are required in Section C406.1.1, the renewable and load management credits required in Table C406.1.2 shall be permitted to be reduced by the amount of surplus energy efficiency credits.

TABLE C406.1.2—RENEWABLE AND LOAD MANAGEMENT CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP

BUILDING OCCUPANCY GROUP	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 and I-1	34	37	31	46	48	56	49	56	38	31	42	32	26	33	34	23	27	25	25
I-2	23	24	25	25	25	28	26	30	22	25	32	24	25	28	29	26	28	22	20
R-1	30	28	35	30	34	36	34	37	41	32	37	27	28	33	32	25	29	22	18
B	38	39	45	42	45	49	47	56	57	44	55	42	38	47	46	38	45	38	31
A-2	8	8	9	9	8	9	9	11	13	8	11	9	8	10	9	8	9	8	3
M	32	32	42	37	39	47	44	58	57	42	54	46	38	48	5	42	45	38	34
E	27	34	38	37	39	47	44	58	57	42	54	46	38	48	50	42	45	38	34
S-1 and S-2	89	90	90	90	90	90	90	90	90	90	90	90	70	90	90	84	86	71	54
All other	35	39	46	42	46	52	49	56	56	40	52	42	37	44	44	36	39	32	28

C406.2 Additional energy efficiency credits achieved. Each energy efficiency credit measure used to meet credit requirements for the project shall have efficiency that is greater than the requirements in Sections C402 through C405. Measures installed in the project that meet the requirements in Sections C406.2.1 through C406.2.6 shall achieve the base credits listed for the measure and occupancy type in Tables C406.2(1) through C406.2(9) or, where calculations required by Sections C406.2.1 through C406.2.6 create or modify the table credits, the credits achieved shall be based on the calculations. Energy credits achieved for measures shall be determined by one of the following, as applicable:

1. The measure's energy credit shall be the base energy credit from Tables C406.2(1) through C406.2(9) for the measure where no adjustment factor or calculation is included in the description of the measure in Section C406.2.

2. The measure's energy credit shall be the base energy credit for the measure adjusted by a factor or equation as stated in the description of the measure in Section C406.2. Where adjustments are applied, each measure's energy credit shall be rounded to the nearest whole number.
3. The measure's energy credit shall be calculated as stated in the measure's description in Section C406.2, where each individual measure credit shall be rounded to the nearest whole number.

Energy credits achieved for the project shall be the sum of the individual measure's energy credits. Credits are available for the measures listed in this section. Where a project contains multiple building occupancy groups:

1. Credits achieved for each occupancy group shall be summed and then weighted by the *conditioned floor area* of each occupancy group to determine the weighted average project energy credits achieved.
2. Improved envelope efficiency (E01 through E06), HVAC performance (H01) and lighting reduction (L06) measure credits shall be determined for the *building* or permitted *conditioned floor area* as a whole. Credits for other measures shall be determined for each occupancy separately. Credits shall be taken from applicable tables or calculations for each occupancy and weighted by the building occupancy group floor area.

C406.2.1 More efficient building thermal envelope. A project shall achieve credits for improved envelope performance by complying with one of the following measures:

1. Section C406.2.1.1: E01.
2. Section C406.2.1.2: E02.
3. Section C406.2.1.3: E03.
4. Both E02 and E03.
5. Any combination of:
 - 5.1. Section C406.2.1.3: E03.
 - 5.2. Section C406.2.1.4: E04.
 - 5.3. Section C406.2.1.5: E05.
 - 5.4. Section C406.2.1.6: E06.

C406.2.1.1 E01 Improved envelope performance ASHRAE 90.1 Appendix C. *Building thermal envelope* measures shall be installed to improve the energy performance of the project. The achieved energy credits shall be determined using Equation 4-13.

Equation 4-13 $EC_{ENV} = 1,000 \times (EPF_B - EPF_P) / EPF_B$

where:

EC_{ENV} = E01 measure energy credits.

EPF_B = Base envelope performance factor calculated in accordance with ASHRAE 90.1 Appendix C.

EPF_P = Proposed envelope performance factor calculated in accordance with ASHRAE 90.1 Appendix C.

C406.2.1.2 E02 Component performance envelope reduction. Energy credits shall be achieved where the component performance of the *building thermal envelope* as designed is not less than 15 percent below the component performance of the *building thermal envelope* in accordance with Section C402.1.5.

C406.2.1.3 E03 Reduced air leakage. Energy credits shall be achieved where tested building *air leakage* is not less than 10 percent of the maximum leakage permitted by Section C402.5.1.2, provided that the *building* is tested in accordance with the applicable method in Section C402.5.1.2. Energy credits achieved for measure E03 shall be determined as follows:

Equation 4-13 $EC_{E03} = EC_B \times EC_{adj}$

where:

EC_{E03} = Energy efficiency credits achieved for envelope leakage reduction. EC_B = Section C406.2.1.3 credits from Tables C406.2(1)

through C406.2(9). $EC_{adj} = L_s / EC_a$

L_s = Leakage savings fraction: the lesser of $[(L_r - L_m) / L_r]$ or 0.8.

L_r = Maximum leakage permitted for tested buildings, by occupancy group, in accordance with Section C402.5.1.2.

L_m = Measured leakage in accordance with Section C402.5.1.2.3 or C402.5.1.2.4.

EC_a = Energy credit alignment factor: 0.37 for whole-building tests in accordance with Section C402.5.1.2.3 or 0.25 for dwelling and sleeping unit enclosure tests in accordance with Section C402.5.1.2.4.

C406.2.1.4 E04 Added roof insulation. Energy credits shall be achieved for insulation that is in addition to the required insulation in Table C402.1.3. All roof areas in the project shall have additional R-10 *continuous insulation* included in the *roof assembly*. For attics, this is permitted to be achieved with fill or batt insulation rated at R-10 that is continuous and not interrupted by ceiling or roof joists. Where interrupted by joists, the added insulation shall be not less than R-13. Alternatively, one-half of the base credits shall be achieved where the added R-value is one-half of the additional R-value required by this section.

C406.2.1.5 E05 Added wall insulation. Energy credits shall be achieved for insulation applied to not less than 90 percent of all opaque wall area in the project that is in addition to the required insulation in Table C402.1.3. Opaque walls shall have additional R-5 *continuous insulation* included in the wall assembly. Alternatively, one-half of the base credits shall be achieved where the added R-value is R-2.5.

TABLE C406.2(1)—BASE ENERGY CREDITS FOR GROUP R-2, R-4 AND I-1 OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	7	6	2	4	1	1	4	1	1	22	1	3	29	10	1	32	27	30	39
E03	Reduced air leakage	C406.2.1.3	15	10	12	8	6	16	13	5	1	7	7	9	65	16	11	73	43	52	26
E04	Add roof insulation	C406.2.1.4	1	1	1	1	1	1	4	3	1	5	3	4	6	5	4	7	7	6	8
E05	Add wall insulation	C406.2.1.5	10	10	6	8	5	6	8	4	1	8	3	4	11	7	3	14	12	13	13
E06	Improve fenestration	C406.2.1.6	7	7	4	6	9	11	13	3	1	22	5	10	27	18	7	41	33	22	21
H01	HVAC performance	C406.2.2.1	20	19	16	17	14	13	11	11	5	13	10	8	15	12	7	18	14	17	19
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	3	1	1	6	2	3	10	5	2	14	10	13	16
H03	Cooling efficiency	C406.2.2.3	7	6	4	4	3	3	1	1	1	1	1	1	1	1	x	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	9	10	8	22	20	25	16	17	32	21	24	17	23	27	16	21	24	18	18
H05	DOAS/fan control	C406.2.2.5	32	31	27	28	23	23	28	21	12	42	24	24	56	36	19	73	54	70	79
W01	SHW preheat recovery	C406.2.3.1 a	61	63	74	74	85	88	101	100	121	103	109	122	102	111	130	93	106	99	96
W02	Heat pump water heater	C406.2.3.1 b	50	52	62	61	72	74	86	85	104	88	94	106	88	96	112	81	92	87	84
W03	Efficient gas water heater	C406.2.3.1 c	38	39	46	46	53	55	63	62	76	64	68	76	64	69	81	58	66	62	60
W04	SHW pipe insulation	C406.2.3.2	7	7	8	7	8	8	8	9	10	8	9	9	7	8	9	6	7	6	6
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	3	3	3	3	3	3	3	3	4	3	3	4	3	3	4	3	3	3	2
W07	SHW heat trace system	C406.2.3.3 c	12	12	13	13	14	15	15	15	18	14	15	16	13	14	16	11	13	11	10
W08	SHW submeters	C406.2.3.4	11	11	13	13	15	16	18	18	22	19	20	22	19	20	24	17	20	18	18
W09	SHW flow reduction	C406.2.3.5	22	22	27	26	31	32	37	37	45	38	40	45	38	41	48	35	39	37	36
W10	Shower heat recovery	C406.2.3.6	15	16	19	19	22	23	26	26	32	27	29	32	27	29	34	25	28	27	26
P01	Energy monitoring	C406.2.4	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	3
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
L03	Increase occp. sensor	C406.2.5.3	3	3	4	4	4	4	3	4	3	2	3	2	1	1	2	1	1	1	1
L04	Increase daylight area	C406.2.5.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L05	Residential light control	C406.2.5.5	8	8	9	9	9	9	8	8	10	6	8	7	4	6	8	3	5	4	3
L06	Light power reduction	C406.2.5.6	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1
Q01	Efficient elevator	C406.2.6.1	4	4	4	4	5	5	5	5	5	4	5	5	4	4	5	4	4	4	3
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	15	15	17	16	17	18	17	18	20	16	17	18	15	16	18	13	15	13	12
Q04	Fault detection	C406.2.6.4	3	3	2	3	2	2	2	2	1	2	2	1	1	2	1	3	2	3	3

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(2)—BASE ENERGY CREDITS FOR GROUP I-2 OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	1	1	1	1	2	1	1	1	3	1	3	11	27	7	10	3	3	2	10
E03	Reduced air leakage	C406.2.1.3	5	3	4	3	5	8	8	3	2	6	2	2	7	3	1	9	7	19	5
E04	Add roof insulation	C406.2.1.4	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	3
E05	Add wall insulation	C406.2.1.5	1	3	1	3	2	2	9	4	1	4	1	1	3	1	1	3	3	3	3
E06	Improve fenestration	C406.2.1.6	1	1	1	1	1	1	1	1	1	4	3	5	5	1	1	5	5	2	2
H01	HVAC performance	C406.2.2.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H02	Heating efficiency	C406.2.2.2	x	x	x	x	2	3	4	3	7	6	4	6	8	6	10	11	12	15	19
H03	Cooling efficiency	C406.2.2.3	6	6	4	4	3	3	2	2	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	41	41	40	40	42	36	42	37	39	49	40	46	56	46	61	65	68	82	93
W01	SHW preheat recovery	C406.2.3.1 a	4	4	4	4	5	5	5	5	6	6	6	6	6	6	6	6	5	5	5
W02	Heat pump water heater	C406.2.3.1 b	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
W03	Efficient gas water heater	C406.2.3.1 c	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
W04	SHW pipe insulation	C406.2.3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P01	Energy monitoring	C406.2.4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	5	5	5	5	5	6	5	6	6	5	6	6	5	5	5	4	4	3	2
L03	Increase occp. sensor	C406.2.5.3	5	5	5	5	5	5	5	5	6	5	5	6	5	5	5	4	4	3	2
L04	Increase daylight area	C406.2.5.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	7	7	7	7	7	7	7	7	9	7	7	8	6	7	7	5	5	4	3
Q01	Efficient elevator	C406.2.6.1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3	3	4	4

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U -Factor $\times$ Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(3)—BASE ENERGY CREDITS FOR GROUP R-1 OCCUPANCIES^a

	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	2	3	1	2	1	3	3	2	1	5	2	2	7	4	2	9	7	9	11
E03	Reduced air leakage	C406.2.1.3	15	9	12	8	6	16	7	5	10	14	3	1	19	5	1	28	16	28	18
E04	Add roof insulation	C406.2.1.4	1	1	1	2	2	1	2	1	1	2	1	2	2	1	2	3	2	2	3
E05	Add wall insulation	C406.2.1.5	18	26	11	25	3	4	5	3	1	6	2	4	7	4	4	8	6	8	5
E06	Improve fenestration	C406.2.1.6	2	2	1	2	2	3	5	3	1	6	3	4	9	7	6	13	8	6	6
H01	HVAC performance	C406.2.2.1	21	20	17	18	16	13	12	12	11	11	11	8	11	11	8	13	11	14	16
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	1	1	6	2	1	1	3	2	2	6	4	8	11
H03	Cooling efficiency	C406.2.2.3	7	6	4	4	3	2	1	2	1	1	2	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	32	30	26	28	25	23	24	22	28	26	22	20	30	26	19	41	34	48	62
W01	SHW preheat recovery	C406.2.3.1 a	18	19	22	22	25	27	31	21	32	34	34	38	37	36	40	36	37	36	35
W02	Heat pump water heater	C406.2.3.1 b	14	15	18	17	20	22	25	25	27	29	29	32	31	31	34	30	32	31	30
W03	Efficient gas water heater	C406.2.3.1 c	11	12	14	14	16	17	19	19	20	21	21	24	23	23	25	22	23	23	22
W04	SHW pipe insulation	C406.2.3.2	3	3	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1
W07	SHW heat trace system	C406.2.3.3 c	5	6	6	6	6	7	7	7	7	7	7	8	7	7	8	7	7	6	6
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	6	7	8	8	9	10	11	11	12	13	13	14	14	13	15	13	14	14	13
W10	Shower heat recovery	C406.2.3.6	4	5	5	5	6	7	8	8	8	9	9	10	10	9	10	9	10	10	9
P01	Energy monitoring	C406.2.4	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
L03	Increase occp. sensor	C406.2.5.3	3	3	3	3	3	3	3	3	3	4	2	3	2	2	3	2	2	1	1
L04	Increase daylight area	C406.2.5.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	1	1	2	2	2	2	2	2	2	2	1	2	1	1	2	1	1	1	1
Q01	Efficient elevator	C406.2.6.1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	9	9	10	10	10	11	11	11	11	11	11	12	11	11	12	10	11	10	9
Q04	Fault detection	C406.2.6.4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(4)—BASE ENERGY CREDITS FOR GROUP B OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	7	8	3	6	5	3	7	3	1	13	4	8	21	15	11	13	24	37	43
E03	Reduced air leakage	C406.2.1.3	5	3	4	2	2	2	5	1	x	8	x	2	13	4	x	18	9	18	7
E04	Add roof insulation	C406.2.1.4	2	2	2	2	2	2	3	2	1	3	1	2	3	2	2	3	3	2	3
E05	Add wall insulation	C406.2.1.5	13	14	8	11	4	4	7	4	1	5	2	4	6	4	3	9	7	10	8
E06	Improve fenestration	C406.2.1.6	5	5	4	5	7	7	8	2	1	8	2	4	10	5	1	21	17	10	9
H01	HVAC performance	C406.2.2.1	22	22	19	20	17	17	15	15	11	15	15	11	16	15	11	19	17	18	20
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	1	1	1	3	2	2	5	4	3	9	7	8	12
H03	Cooling efficiency	C406.2.2.3	7	6	4	5	3	3	1	2	1	1	2	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	31	31	27	29	25	25	28	26	18	35	28	28	47	38	29	64	53	58	74
W01	SHW preheat recovery	C406.2.3.1 a	8	9	10	9	11	11	12	12	14	13	13	14	13	13	15	12	13	14	14
W02	Heat pump water heater	C406.2.3.1 b	3	3	3	3	4	4	5	4	5	5	5	6	5	5	6	5	5	6	6
W03	Efficient gas water heater	C406.2.3.1 c	5	5	6	6	7	7	8	7	8	8	8	9	8	8	9	8	8	9	8
W04	SHW pipe insulation	C406.2.3.2	3	3	4	4	4	4	4	4	5	4	4	5	4	4	5	4	4	4	4
W05	Point of use water heaters	C406.2.3.3 a	12	15	17	16	18	18	19	19	22	20	20	22	20	20	22	18	19	20	19
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	4	4	4	4	5	5	5	5	6	5	5	6	5	5	6	5	5	5	5
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
P01	Energy monitoring	C406.2.4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	5	5	6	6	6	6	6	6	7	6	6	6	5	5	6	4	5	3	2
L03	Increase occp. sensor	C406.2.5.3	5	6	6	6	6	6	6	6	8	6	6	6	5	5	6	4	5	4	3
L04	Increase daylight area	C406.2.5.4	7	7	8	8	8	8	8	8	9	6	7	7	6	6	6	6	6	7	5
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	7	7	8	8	8	8	8	8	9	7	8	8	6	7	8	5	6	5	3
Q01	Efficient elevator	C406.2.6.1	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	4	5	4	4
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	3	3	3	3

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(5)—BASE ENERGY CREDITS FOR GROUP A-2 OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	1	1	1	1	13	1	3	2	1	4	4	5	5	5	6	6	6	6	6
E03	Reduced air leakage	C406.2.1.3	2	1	1	1	2	3	11	2	1	24	4	6	33	9	3	42	29	36	16
E04	Add roof insulation	C406.2.1.4	1	1	x	1	1	1	2	1	1	1	1	1	2	2	1	2	2	1	2
E05	Add wall insulation	C406.2.1.5	1	1	x	1	1	2	3	3	1	2	1	1	2	2	2	2	2	2	2
E06	Improve fenestration	C406.2.1.6	1	1	1	1	1	1	2	2	1	1	2	2	3	2	1	4	4	1	1
H01	HVAC performance	C406.2.2.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H02	Heating efficiency	C406.2.2.2	x	x	x	x	1	1	6	3	3	10	6	8	15	11	10	19	15	23	28
H03	Cooling efficiency	C406.2.2.3	6	5	3	4	3	2	1	1	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	29	27	20	25	24	21	36	27	15	51	35	38	67	53	45	84	70	97	115
W01	SHW preheat recovery	C406.2.3.1 a	24	26	31	29	33	35	37	38	45	38	41	44	37	40	44	34	38	33	30
W02	Heat pump water heater	C406.2.3.1 b	15	16	19	18	21	23	25	25	29	26	28	30	26	28	31	25	27	24	22
W03	Efficient gas water heater	C406.2.3.1 c	15	16	19	18	21	22	23	24	28	24	25	27	23	25	27	21	24	21	18
W04	SHW pipe insulation	C406.2.3.2	2	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	2	2	2
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3	3	3	3
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
P01	Energy monitoring	C406.2.4	2	2	2	2	2	1	2	1	1	2	1	1	2	2	1	2	2	2	3
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	x
L03	Increase occp. sensor	C406.2.5.3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	x
L04	Increase daylight area	C406.2.5.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1	2	1	1
Q01	Efficient elevator	C406.2.6.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Q02	Commercial kitchen equip.	C406.2.6.2	24	26	28	27	28	29	27	29	32	26	28	29	24	26	28	21	23	19	17
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	2	2	2	2	2	2	2	1	2	2	1	2	2	2	3	2	3	4

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(6)—BASE ENERGY CREDITS FOR GROUP M OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	14	14	8	13	7	9	20	15	1	35	18	28	41	37	40	43	44	46	31
E03	Reduced air leakage	C406.2.1.3	3	3	2	2	3	3	19	3	1	44	6	11	56	13	6	64	44	43	19
E04	Add roof insulation	C406.2.1.4	8	6	5	7	7	7	18	16	4	19	18	20	21	22	23	24	26	24	30
E05	Add wall insulation	C406.2.1.5	64	65	48	62	13	15	23	18	4	27	21	27	25	24	25	23	24	24	16
E06	Improve fenestration	C406.2.1.6	4	3	3	3	4	4	6	5	2	7	5	7	7	5	7	10	10	3	3
H01	HVAC performance	C406.2.2.1	31	30	26	28	23	21	23	20	14	27	21	22	29	25	23	32	28	30	33
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	10	3	1	19	8	15	26	17	18	29	24	27	31
H03	Cooling efficiency	C406.2.2.3	10	9	7	7	5	4	2	2	1	1	2	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	48	48	42	47	40	38	66	46	31	98	61	82	120	91	90	134	115	125	141
W01	SHW preheat recovery	C406.2.3.1 a	12	13	16	15	18	20	19	21	26	17	21	21	16	19	21	13	16	15	13
W02	Heat pump water heater	C406.2.3.1 b	3	3	4	3	4	5	5	5	7	5	6	6	4	5	6	4	4	4	4
W03	Efficient gas water heater	C406.2.3.1 c	6	7	8	8	10	10	10	11	14	9	11	11	8	10	11	7	8	8	7
W04	SHW pipe insulation	C406.2.3.2	3	3	4	4	4	4	4	4	5	4	4	5	4	4	5	4	4	4	4
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	4	4	4	4	5	5	5	5	6	5	5	6	5	5	6	5	5	5	5
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
P01	Energy monitoring	C406.2.4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	9	9	11	10	12	13	11	13	15	9	12	11	7	9	10	5	7	5	3
L03	Increase occp. sensor	C406.2.5.3	9	9	11	10	12	13	12	13	15	10	12	11	7	10	11	6	8	5	4
L04	Increase daylight area	C406.2.5.4	12	13	15	14	16	17	15	16	20	11	14	13	9	12	11	8	10	10	8
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	12	12	14	14	15	16	12	15	19	8	12	9	6	10	7	6	7	6	5
Q01	Efficient elevator	C406.2.6.1	3	3	4	3	4	4	4	4	5	3	4	4	3	4	4	3	3	3	2
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	2	2	2	2	2	2	2	1	2	2	1	2	2	2	3	2	3	4

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(7)—BASE ENERGY CREDITS FOR GROUP E OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	8	18	7	19	12	13	20	17	11	24	20	17	33	32	29	40	38	46	44
E03	Reduced air leakage	C406.2.1.3	4	3	3	3	2	5	2	1	1	1	1	1	1	1	1	2	1	1	1
E04	Add roof insulation	C406.2.1.4	8	8	4	9	5	7	16	7	1	14	7	10	18	13	13	23	25	22	28
E05	Add wall insulation	C406.2.1.5	5	7	4	8	3	6	8	6	2	6	3	6	5	5	6	7	6	7	8
E06	Improve fenestration	C406.2.1.6	8	10	6	9	11	11	15	9	1	16	8	15	22	18	19	33	29	19	18
H01	HVAC performance	C406.2.2.1	30	28	25	26	23	21	20	18	15	19	18	17	19	20	15	23	20	25	29
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	4	3	3	5	5	10	9	11	6	15	11	18	26
H03	Cooling efficiency	C406.2.2.3	9	8	6	7	5	4	2	2	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	45	42	37	41	36	34	41	39	30	43	46	58	57	65	40	79	63	88	117
W01	SHW preheat recovery	C406.2.3.1 a	7	7	9	8	10	11	13	13	15	14	15	15	15	14	17	13	15	14	12
W02	Heat pump water heater	C406.2.3.1 b	4	4	6	5	7	7	9	9	10	10	10	11	11	10	12	10	11	10	9
W03	Efficient gas water heater	C406.2.3.1 c	4	4	6	5	6	7	8	8	9	9	9	10	9	9	11	8	10	9	7
W04	SHW pipe insulation	C406.2.3.2	3	3	4	4	4	4	4	5	6	5	5	6	5	5	7	4	5	4	4
W05	Point of use water heaters	C406.2.3.3 a	3	4	4	4	4	5	5	5	6	5	5	5	5	5	6	4	5	4	3
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	2	1	1
W07	SHW heat trace system	C406.2.3.3 c	4	4	4	4	5	5	5	6	7	6	6	7	6	6	8	5	7	5	5
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	2	2	2	2	3	3	3	3	4	3	3	4	3	3	4	3	3	3	3
P01	Energy monitoring	C406.2.4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	5	5	5	6	6	6	5	6	7	6	6	6	5	5	6	4	4	3	2
L03	Increase occp. sensor	C406.2.5.3	4	4	5	5	5	6	6	6	7	6	6	5	4	4	5	3	4	3	2
L04	Increase daylight area	C406.2.5.4	6	6	7	7	7	7	7	7	8	6	6	6	5	5	6	5	5	5	4
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	6	7	7	7	8	8	8	8	10	7	8	7	6	7	8	5	6	4	2
Q01	Efficient elevator	C406.2.6.1	3	4	4	4	4	5	5	5	5	5	5	5	5	5	5	4	5	4	3
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	4	4	4	4	3	3	3	3	2	3	3	3	3	3	2	4	3	4	4

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates measure is not available in that climate zone for that measure

TABLE C406.2(8)—BASE ENERGY CREDITS FOR GROUP S-1 AND S-2 OCCUPANCIES^a

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	14	14	1	12	1	9	27	16	2	37	29	39	44	47	50	43	52	55	74
E03	Reduced air leakage	C406.2.1.3	2	2	1	2	1	3	31	3	1	77	14	17	92	25	8	95	71	69	26
E04	Add roof insulation	C406.2.1.4	13	12	10	11	10	11	18	17	7	14	19	18	14	20	22	10	14	12	19
E05	Add wall insulation	C406.2.1.5	19	23	13	21	7	10	15	12	3	10	12	13	9	12	12	7	9	9	8
E06	Improve fenestration	C406.2.1.6	7	5	8	7	6	6	2	4	2	4	1	6	5	1	7	3	4	4	7
H01	HVAC performance	C406.2.2.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	16	3	1	33	17	22	41	31	21	44	38	43	43
H03	Cooling efficiency	C406.2.2.3	7	7	4	5	3	3	1	1	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	35	37	26	33	24	27	77	35	14	141	83	96	168	132	90	180	157	177	178
W01	SHW preheat recovery	C406.2.3.1 a	8	7	9	8	10	10	8	10	12	5	8	8	4	6	9	3	4	3	3
W02	Heat pump water heater	C406.2.3.1 b	2	2	2	2	2	2	2	2	3	1	2	2	1	2	2	1	1	1	1
W03	Efficient gas water heater	C406.2.3.1 c	4	4	5	4	5	5	4	5	6	3	4	4	2	3	5	2	2	2	2
W04	SHW pipe insulation	C406.2.3.2	3	3	4	3	3	3	2	3	4	2	2	3	1	2	3	1	1	1	1
W05	Point of use water heaters	C406.2.3.3 a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	4	4	4	3	4	4	3	4	5	2	3	3	2	2	4	2	2	2	2
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
P01	Energy monitoring	C406.2.4	5	5	6	6	6	6	5	6	6	5	5	5	5	5	6	5	5	5	5
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	10	10	12	11	12	14	9	12	14	6	9	9	3	6	9	3	5	3	2
L03	Increase occp. sensor	C406.2.5.3	12	12	14	13	15	14	12	14	17	7	11	11	5	7	11	4	6	3	3
L04	Increase daylight area	C406.2.5.4	15	14	18	16	18	17	13	16	21	7	12	11	5	8	10	4	6	6	5
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	14	14	17	16	17	17	13	17	19	8	13	12	5	8	12	4	6	4	2
Q01	Efficient elevator	C406.2.6.1	15	14	18	16	18	18	15	18	21	9	14	14	7	10	14	5	7	5	5
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	3	2	3	2	2	3	2	1	5	3	3	5	4	3	6	5	6	6

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U-Factor × Area.

a. "x" indicates credit is not available in that climate zone for that measure.

TABLE C406.2(9)—BASE ENERGY CREDITS FOR OTHER OCCUPANCIES^{a, b}

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	7	8	3	7	5	5	11	7	2	18	10	14	26	20	19	24	25	29	32
E03	Reduced air leakage	C406.2.1.3	6	4	5	4	3	7	12	3	2	28	5	6	36	9	3	41	27	33	15
E04	Add roof insulation	C406.2.1.4	4	4	3	4	4	4	8	6	2	7	6	7	9	8	9	9	10	9	12
E05	Add wall insulation	C406.2.1.5	16	19	11	17	5	6	10	7	2	9	6	8	9	7	7	9	9	10	8
E06	Improve fenestration	C406.2.1.6	4	4	3	4	5	6	6	4	1	9	4	7	11	7	6	16	14	8	8
H01	HVAC performance	C406.2.2.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	6	2	3	11	6	8	15	11	9	18	15	19	23
H03	Cooling efficiency	C406.2.2.3	7	7	5	5	4	3	1	2	1	x	x	x	x	x	x	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	37	36	31	34	30	28	43	32	23	61	42	49	75	61	49	90	77	93	90
W01	SHW preheat recovery	C406.2.3.1 a	18	19	22	21	25	26	28	29	34	29	31	34	29	31	35	26	29	27	26
W02	Heat pump water heater	C406.2.3.1 b	12	12	15	14	17	17	20	20	24	21	22	25	21	23	26	20	22	21	20
W03	Efficient gas water heater	C406.2.3.1 c	11	11	13	13	15	16	17	17	21	18	19	21	18	19	22	16	18	17	16
W04	SHW pipe insulation	C406.2.3.2	3	3	4	4	4	4	4	4	5	4	4	5	4	4	5	3	4	3	3
W05	Point of use water heaters	C406.2.3.3 a	8	10	11	10	11	12	12	12	14	13	13	14	13	13	14	11	12	12	11
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	1	2	1	1	2	1	1	2	1	1	1	1
W07	SHW heat trace system	C406.2.3.3 c	5	5	5	5	6	6	6	6	7	6	6	7	5	6	7	5	5	5	5
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	6	6	7	7	8	9	10	10	11	10	11	12	10	11	12	10	11	10	10
P01	Energy monitoring	C406.2.4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	5	5	5	5	6	6	5	6	7	5	5	5	4	4	5	3	4	3	2
L03	Increase occp. sensor	C406.2.5.3	5	6	6	6	7	7	6	7	8	5	6	6	4	5	6	3	4	3	2
L04	Increase daylight area	C406.2.5.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	7	7	8	7	8	8	7	8	9	5	7	6	4	5	6	4	4	3	2
Q01	Efficient elevator	C406.2.6.1	4	4	5	4	5	5	5	5	6	4	5	5	4	4	5	3	4	3	3
Q02	Commercial kitchen equip.	C406.2.6.2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q03	Residential kitchen equip.	C406.2.6.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Q04	Fault detection	C406.2.6.4	3	3	3	3	3	2	3	2	2	3	3	2	3	3	2	4	3	4	4

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = U -Factor $\times$ Area.

a. "x" indicates credit is not available in that climate zone for that measure.

b. Other occupancy groups include all groups except Groups A-2, B, E, I, M, S and R.

C406.2.1.6 E06 Improve fenestration. Energy credits shall be achieved for improved energy characteristics of all vertical *fenestration* in the project meeting the requirements in Table C406.2.1.6. The area-weighted average *U-factor* and SHGC of all vertical *fenestration* shall be equal to or less than the value shown in the table. Where vertical *fenestration* is located under a permanently attached shading projection with a projection factor (PF) not less than 0.2 as determined in accordance with Section C402.4.3, the SHGC for that *fenestration* shall be permitted to be divided by 1.2. The area-weighted average *visible transmittance* (VT) of all vertical *fenestration* shall be equal to or greater than the value shown in the table.

TABLE C406.2.1.6—VERTICAL FENESTRATION REQUIREMENTS FOR ENERGY CREDIT E06				
APPLICABLE CLIMATE ZONE	MAXIMUM U-FACTOR		MAXIMUM SHGC	MINIMUM VT
	Fixed	Operable		
0–2	0.45	0.52	0.21	0.28
3	0.33	0.44	0.23	0.30
4–5	0.31	0.38	0.34	0.41
6–7	0.26	0.32	0.38	0.44
8	0.24	0.28	0.38	0.44

C406.2.2 More efficient HVAC equipment performance. All heating and cooling systems shall meet the minimum requirements of Section C403 and efficiency improvements shall be referenced to minimum efficiencies listed in tables referenced by Section C403.2.3. Where multiple efficiency requirements are listed, equipment shall meet the seasonal or part-load efficiencies including SEER, integrated energy efficiency ratio (IEER), *integrated part load value* (IPLV) or AFUE. Equipment that is larger than the maximum capacity range indicated in tables referenced by Section C403.2.3 shall utilize the values listed for the largest capacity equipment for the associated equipment type shown in the table. Where multiple individual heating or cooling systems serve the project, the improvement shall be the weighted-average improvement based on individual system capacity. Systems are permitted to achieve HVAC energy credits by meeting the requirements of one of the following:

1. C406.2.2.1 H01.
2. C406.2.2.2 H02.
3. C406.2.2.3 H03.
4. C406.2.2.4 H04.
5. C406.2.2.5 H05.
6. Any combination of H02, H03, H04 and H05.
7. The combination of H01 and H04.

C406.2.2.1 H01 HVAC Total System Performance Ratio (TSPR). H01 energy credits shall be earned where systems are permitted to use Section C409 and where the savings ($TSPR_s$) based on the proposed TSPR ($TSPR_p$) compared to the target TSPR is 5 percent or more. If savings are greater than 5 percent, determine H01 earned credits using Equation 4-15. Energy credits for H01 shall not be combined with energy credits from HVAC measures H02, H03 or H05.

Equation 4-15 $EC_{TSPR} = EC_{BASE} \times AREA_{TSPR} \times TSPR_s / 0.05$

EC_{TSPR} = Energy credits achieved for H01.

EC_{BASE} = H01 base energy credits from Tables C406.2(1) through C406.2(9).

$TSPR_s$ = The lesser of 0.20 and $[1 - (TSPR_r / TSPR_p)]$.

where:

$AREA_{TSPR}$ = (floor area served by systems included in TSPR)/(total building conditioned floor area)

$TSPR_p$ = HVAC TSPR of the proposed design calculated in accordance with Sections C409.4, C409.5 and C409.6.

$TSPR_r = TSPR_r / MPF$.

$TSPR_r$ = HVAC TSPR of the reference building design calculated in accordance with Sections C409.4, C409.5 and C409.6.

MPF = Mechanical performance factor from Table C409.4 based on climate zone and building use type. Where a building has multiple building use types, MPF shall be area weighted in accordance with Section C409.4.

C406.2.2.2 H02 More efficient HVAC equipment heating performance. In accordance with Section C406.1.1, not less than 90 percent of the total HVAC heating capacity serving the total *conditioned floor area* of the entire *building* or tenant space shall comply with the requirements of this section.

1. Equipment installed shall be types that have their efficiency listed in tables referenced by Section C403.2.3. Electric resistance heating capacity shall be limited to 20 percent of system capacity, with the exception of heat pump supplemental heating.
2. Equipment shall exceed the minimum heating efficiency requirements listed in tables referenced by Section C403.2.3 by not less than 5 percent. Where equipment exceeds the minimum annual heating efficiency requirements by more

than 5 percent, energy efficiency credits for heating shall be determined using Equation 4-16, rounded to the nearest whole number.

Equation 4-16 $EEC_{HEH} = EEC_{H5} \times (HEI/0.05)$

where:

EEC_{HEH} = Energy efficiency credits for heating efficiency improvement.

EEC_{H5} = Section C406.2.2.2 credits from Tables C406.2(1) through C406.2(9).

HEI = The lesser of the improvement above minimum heating efficiency requirements, expressed as a fraction, or 20 percent (0.20). Where heating equipment with different minimum efficiencies is included in the building, a heating capacity weighted-average improvement shall be used. Where electric resistance primary heating or reheat is included in the building, it shall be included in the weighted-average improvement with an HEI of 0. Supplemental gas and electric heat for heat pump systems shall be excluded from the weighted HEI. For heat pumps rated at multiple ambient temperatures, the efficiency at 47°F (8.3°C) shall be used. For metrics that increase as efficiency increases, HEI shall be calculated as follows:

$$HEI = (HM_{DES} / HM_{MIN}) - 1$$

where:

HM_{DES} = Design heating efficiency metric, part-load or annualized where available.

HM_{MIN} = Minimum required heating efficiency metric, part-load or annualized where available from Section C403.2.3. **Exception:** In low-energy spaces complying with Section C402.1.1, not less than 90 percent of the installed heating capacity is provided by electric infrared or gas-fired radiant heating equipment for localized heating applications. Such spaces shall achieve base energy credits only for EEC_{H5} .

C406.2.2.3 H03 More efficient HVAC cooling equipment and fan performance. In accordance with Section C406.1.1, not less than 90 percent of the total HVAC cooling capacity serving the total *conditioned floor area* of the entire *building* or *tenant space* shall comply with all of the requirements of this section.

1. Equipment installed shall be types that are listed in tables referenced by Section C403.2.3.
2. Equipment shall exceed the minimum cooling efficiency requirements listed in tables referenced by Section C403.2.3 by not less than 5 percent. For water-cooled chiller plants, heat-rejection equipment performance in Table C403.2.3(8) shall also be increased by at least the chiller efficiency improvement. Where equipment exceeds both the minimum annual cooling efficiency and heat-rejection efficiency requirements by more than 5 percent, energy efficiency credits for cooling shall be determined using Equation 4-17, rounded to the nearest whole number.

Where fan energy is not included in the packaged equipment rating or it is and the fan size has been increased from the as-rated equipment condition, fan power or horsepower shall be less than 95 percent of the allowed fan power in Section C403.2.12.1.

Equation 4-17 $EEC_{HEC} = EEC_{H5} \times (CEI/0.05)$

EEC_{HEC} = Energy efficiency credits for cooling efficiency improvement.

EEC_{H5} = Section C406.2.2.3 base energy credits from Tables C406.2(1) through C406.2(9).

CEI = The lesser of the improvement above minimum cooling efficiency and heat-rejection performance requirements, expressed as a fraction, or 20 percent (0.20). Where cooling equipment with different minimum efficiencies is included in the building, a cooling capacity weighted-average improvement shall be used. Where multiple cooling efficiency or performance requirements are provided, the equipment shall exceed the annualized energy or part-load requirement. Meeting both part-load and full-load efficiencies is not required.

For metrics that increase as efficiency increases, CEI shall be calculated as follows:

$$CEI = (CM_{DES} / CM_{MIN}) - 1.$$

For metrics that decrease as efficiency increases, CEI shall be calculated as follows:

$$CEI = (CM_{MIN} / CM_{DES}) - 1.$$

where:

CM_{DES} = Design cooling efficiency metric, part-load or annualized where available.

CM_{MIN} = Minimum required cooling efficiency metric, part-load or annualized where available from Section C403.2.3.

For data centers using ASHRAE Standard 90.4, CEI shall be calculated as follows:

$$CEI = (AMLC_{MAX} / AMLC_{DES}) - 1$$

where:

$AMLC_{DES}$ = As-designed annualized mechanical load component calculated in accordance with ASHRAE Standard 90.4, Section 6.5.

$AMLC_{MAX}$ = Maximum annualized mechanical load component from ASHRAE Standard 90.4, Table 6.5.

C406.2.2.4 H04 Residential HVAC control. HVAC systems serving *dwelling units* or *sleeping units* shall be controlled to automatically activate a setback at least 5°F (3°C) for both heating and cooling. The temperature controller shall be configured to

provide setback during occupied sleep periods. The unoccupied setback mode shall be configured to operate in conjunction with one of the following:

1. A manual main control device by each dwelling unit main entrance that initiates setback and nonventilation mode for all HVAC units in the dwelling unit and is clearly identified as "Heating/Cooling Master Setback."
2. Occupancy sensors in each room of the dwelling unit combined with a door switch to initiate setback and nonventilation mode for all HVAC units in the dwelling within 20 minutes of all spaces being vacant immediately after a door switch operation. Where separate room HVAC units are used, an individual occupancy sensor on each unit that is configured to provide setback shall meet this requirement.
3. An advanced learning thermostat or controller that recognizes occupant presence and automatically creates a schedule for occupancy and provides a dynamic setback schedule based on when the spaces are generally unoccupied.
4. An automated control and sensing system that uses geographic fencing connected to the dwelling unit occupants' cell phones and initiates the setback condition when all occupants are away from the building.

C406.2.2.5 H05 Dedicated outdoor air system. Credits for this measure are allowed only where single-zone HVAC units are not required to have multispeed or variable-speed fan control in accordance with Section C403.2.12.5.1. HVAC controls and ventilation systems shall include all of the following:

1. Zone controls shall cycle the heating/cooling unit fans off when not providing required heating and cooling or shall limit fan power to 0.12 watts/cfm (0.056 w/l/s) of zone supply air.
2. Outdoor air shall be supplied by an independent ventilation system designed to provide not more than 130 percent of the minimum outdoor air to each individual occupied zone, as specified by the Florida Building Code, Mechanical.

Exception: Outdoor airflow is permitted to increase during emergency or economizer operation, implemented as described in Item 4.

3. The ventilation system shall have energy recovery with an enthalpy recovery ratio of 65 percent or more at heating design conditions in Climate Zones 3 through 8 and an enthalpy recovery ratio of 65 percent or more at cooling design conditions in Climate Zones 0, 1, 2, 3A, 3B, 4A, 4B, 5A and 6A. In "A" climate zones, energy recovery shall include latent recovery. Where no humidification is provided, heating energy recovery effectiveness is permitted to be based on sensible energy recovery ratio. Where energy recovery effectiveness is less than the 65 percent required for full credit, adjust the credits from Section C406.2 by the factors in Table C406.2.2.5.
4. Where the ventilation system serves multiple zones and the system is not in a latent recovery outside air dehumidification mode, partial economizer cooling through an outdoor air bypass or wheel speed control shall automatically do one of the following:
 - 4.1. Set the energy recovery leaving-air temperature 55°F (13°C) or 100 percent outdoor air bypass when a majority of zones require cooling and outdoor air temperature is below 70°F (21°C).
 - 4.2. The HVAC ventilation system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply-air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room-air temperature.
5. Ventilation systems providing mechanical dehumidification shall use recovered energy for reheat within the limits of Item 4. This shall not limit the use of latent energy recovery for dehumidification.

Where only a portion of the building is permitted to be served by constant air volume units or the enthalpy recovery ratio or sensible energy recovery ratio is less than 65 percent, the base energy credits shown in Section C406.2 shall be prorated as follows:

Equation 4-18 $EC_{DOAS} = EC_{BASE} \times FLOOR_{CAV} \times ERE_{adj}$

where:

EC_{DOAS} = Energy credits achieved for H05.

EC_{BASE} = H05 base energy credits in Section C406.2.

$FLOOR_{CAV}$ = Fraction of whole-project gross conditioned floor area not required to have variable-speed or multi-speed fan airflow control in accordance with Section C403.2.12.5.

ERE_{adj} = The energy recovery adjustment from Table C406.2.2.5 based on the lower of actual cooling or heating enthalpy recovery ratio or sensible energy recovery ratio where required for the climate zone. Where recovery ratios vary, use a weighted average by supply airflow.

TABLE C406.2.2.5—DOAS ENERGY RECOVERY ADJUSTMENTS

ERE_{adj} BASED ON LOWER OF ACTUAL HEATING OR COOLING ENERGY RECOVERY EFFECTIVENESS WHERE REQUIRED		
Cooling Err Is at Least	Heating Enthalpy Recovery Ratio or Sensible Energy Recovery Ratio Is at Least	Energy Recovery Effectiveness Adjustment (ERE_{adj})
5%	65%	1.00
60%	60%	0.67

55%	55% ^a	0.33
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TABLE C406.2.2.5—DOAS ENERGY RECOVERY ADJUSTMENTS—continued		
ERE_{adj} BASED ON LOWER OF ACTUAL HEATING OR COOLING ENERGY RECOVERY EFFECTIVENESS WHERE REQUIRED		
Cooling Err Is at Least	Heating Enthalpy Recovery Ratio or Sensible Energy Recovery Ratio Is at Least	Energy Recovery Effectiveness Adjustment (ERE_{adj})
50%	50% ^a	0.25
a. In climate zones where heating recovery is required in Section C403, a heating recovery effectiveness below 60 percent is not allowed for dwelling units.		

C406.2.3 Reduced energy use in service water heating. For projects with service water heating equipment that serves the whole *building*, a *building addition* or a tenant space shall achieve credits through compliance with the requirements of this section. Systems are permitted to achieve energy credits by meeting the requirements of one of the following:

1. Section C406.2.3.1 by selecting one allowed measure W01, W02, W03 or a combination in accordance with Section C406.2.3.1.4.
2. Section C406.2.3.2 W04.
3. Section C406.2.3.3 by selecting one allowed measure: W05, W06 or W07.
4. Section C406.2.3.4 W08.
5. Section C406.2.3.5 W09.
6. Section C406.2.3.6 W10.
7. Any combination of measures in Sections C406.2.3.1 through C406.2.3.6 as long as not more than one allowed measure from Sections C406.2.3.1 and C406.2.3.3 are selected.

C406.2.3.1 Service water heating system efficiency. A project is allowed to achieve energy credits from only one of Sections C406.2.3.1.1 through C406.2.3.1.4.

C406.2.3.1.1 W01 Recovered or renewable water heating. The *building* service water-heating system shall have one or more of the following that are sized to provide not less than 30 percent of the *building's* annual hot water requirements, or sized to provide not less than 70 percent of the *building's* annual hot water requirements if the *building* is required to comply with Section C403.4.5:

1. Waste heat recovery from service hot water, heat recovery chillers, *building* equipment or process equipment.
2. A water-to-water heat pump that precools chilled water return for *building* cooling while heating SHW.
3. On-site renewable energy water-heating systems.

C406.2.3.1.2 W02 Heat pump water heater. Air-source heat pump *water heaters* shall be installed according to the manufacturer's instructions and at least 30 percent of design end-use *service water heating* requirements shall be met using only heat pump heating at an ambient condition of 67.5°F (19.7°C), db without supplemental electric resistance or fossil fuel heating. For a heat pump *water heater* with supplemental electric resistance heating, the heat pump-only capacity shall be deemed at 40 percent of first-hour draw. Where the heat pump-only capacity exceeds 50 percent of the design end-use load, excluding recirculating system losses, the credits from the Section C406.2 tables shall be prorated as follows:

Equation 4-19 $EC_{HPWH} = (EC_{BASE}/0.5) \times \{(CAP_{HPWH})/(Endload)\}$ [not greater than 2] where:

EC_{HPWH} = Energy credits achieved for W02.

EC_{BASE} = W02 base energy credits from Tables C406.2(1) through C406.2(9).

Endload = End-use peak hot water load, excluding load for heat trace or recirculation, Btu/h or kW.

CAP_{HPWH} = The heat pump-only capacity at 50°F (10°C) entering air and 70°F (21°C) entering potable water without supplemental electric resistance or fossil fuel heat, Btu/h or kW.

The heat pump service water heating system shall comply with the following requirements:

1. For systems with an installed total output capacity of more than 100,000 Btu/h (29 kW) at an ambient condition of 67.5°F (19.7°C) db, a preheat storage tank with greater than or equal to 0.75 gallons per 1,000 Btu/h (≥ 9.7 L/kW) of design end-use service water-heating requirements shall be heated only with a heat pump heating when the ambient temperature is greater than 45°F (7.2°C).
2. For systems with piping temperature maintenance, either a heat trace system or a separate *water heater* in series for recirculating system and final heating shall be installed.
3. Heat pump *water heater* efficiency shall meet or exceed one of the following:
 - 3.1. Output-capacity-weighted-average UEF of 3.0 in accordance with 10 CFR 430 Appendix E.
 - 3.2. Output-capacity-weighted-average COP of not less than 4.0 tested at 50°F (10°C) entering air and 70°F (21°C) entering potable water in accordance with ANSI/AHRI 1300.

Where the heat pump capacity at 50°F (10°C) entering air and 70°F (21°C) entering water exceeds 50 percent of the design end-use load, excluding recirculating system losses, the base credits from Section C406.2 shall be prorated based on Equation 4-20.

Equation 4-20 W02 credit = base W02 table credit $\times (HP_e/50\%)$

where:

HP_{if} = Heat pump capacity as a fraction of the design end-use SHW requirements, excluding recirculating system losses, not to exceed 80 percent.

C406.2.3.1.3 W03 Efficient fossil fuel water heater. The combined input-capacity-weighted-average equipment rating of all gas water heating equipment in the building shall be not less than 95 percent E_i or 0.93 UEF. Adjustments shall apply as follows:

1. Where the service water heating system is required to comply with Section C404.2.1, this measure shall achieve 30 percent of the listed base W03 energy credits in Tables C406.2(1) through C406.2(9).
2. Where the installed building service water heating capacity is less than 200,000 Btu/h (59 kW) and weighted UEF is less than 0.93 UEF and not less than 0.82, this measure shall achieve 25 percent of the base W03 credit in Tables C406.2(1) through C406.2(9).

C406.2.3.1.4 Combination service water heating systems. Combination service water heating systems shall achieve credits using one of the measure combinations as follows:

1. (W01 + W02) Where service water heating employs both energy recovery and heat pump water heating, W01 may be combined with W02 and receive the sum of both credits.
2. (W01 + W03) Where service water heating employs both energy recovery and efficient gas water heating, W01 may be combined with W03 and receive the sum of the W01 credit and the portion of the W03 credit based on Item 4.
3. (W02 + W03) Where service water heating employs both heat pump water heating and efficient gas water heating, W02 may be combined with W03 and receive the sum of the W02 credit and the portion of the W03 credit based on Item 4.
4. For Items 2 and 3, the achieved W03 credit shall be the Section C406.2.3.1.3 W03 credit multiplied by the fractional share of total water-heating installed capacity served by gas water heating that is not less than 95 percent E_i or 0.93 UEF. In no case shall the achieved W03 credit exceed 60 percent of the W03 credit in the Section C406.2 tables. In buildings that have a service water heating design generating capacity greater than 900,000 Btu/h (264 kW), that proportioned W03 credit shall be further multiplied by 30 percent.

C406.2.3.2 W04 Service hot water piping insulation increase. Where service hot water is provided by a central water heating system, the hot water pipe insulation thickness shall be at least 1.5 times the thickness required in Section C404.4. All service hot water piping shall be insulated from the hot water source to the fixture shutoff. Where 50 percent or more of hot water piping does not have increased insulation due to installation in partitions, the credit shall be prorated as a percentage of lineal feet of piping with increased insulation.

C406.2.3.3 Service water-heating distribution temperature maintenance. A project is allowed to claim energy credits from only one of the following SHW distribution temperature maintenance measures.

1. **W05 Point of use water heaters.** Credits are available for Group B or E buildings larger than 5,000 square feet (465 m²) where service water heating systems meet the following requirements:
 - 1.1. Fixtures requiring hot water shall be supplied from a local water heater with no recirculating system or heat trace piping.
Exception: Commercial kitchens or showers in locker rooms shall be permitted to have a local recirculating system or heat trace piping where water heaters are located not more than 50 lineal feet (15 m) from the farthest fixture served.
 - 1.2. Supply piping from the water heater to the termination of the fixture supply pipe shall be insulated to the levels shown in Table C403.2.10.
Exceptions:
 1. Piping at locations where a vertical support of the piping is installed.
 2. Where piping passes through a framing member and insulation requires increasing the size of the framing member.
 - 1.3. The water volume in the piping from the water heater to the termination of any individual fixture shall be limited as follows:
 - 1.3.1. Nonresidential public lavatory faucets that are available for use by members of the general public: not more than 2 ounces (59 mL).
 - 1.3.2. Commercial kitchens or showers in locker rooms with recirculating systems or heat trace piping: not more than 24 ounces (710 mL) from the recirculating system or heat trace piping.
 - 1.3.3. All other plumbing fixtures or appliances: not more than 16 ounces (473 mL).
2. **W06 Thermostatic balancing valves.** Credits are available where service water heating is provided centrally and distributed throughout the building with a recirculating system. Each recirculating system branch return connection to the main SHW supply piping shall have an automatic thermostatic balancing valve set to a minimal return water flow when the branch return temperature is greater than 120°F (49°C).
3. **W07 Heat trace system.** Credits are available for projects with gross floor area greater than 10,000 square feet (929 m²) and a central water heating system. The energy credits achieved shall be from Tables C406.2(1) through C406.2(9). This system shall include self-regulating electric heat cables, connection kits and electronic controls. The cable shall be installed directly on the hot water supply pipes underneath the insulation to replace standby losses.

C406.2.3.4 W08 Water-heating system submeters. Each individual *dwelling unit* in a Group R-2 occupancy served by a central service water heating system shall be provided with a service hot water meter connected to a reporting system that provides individual *dwelling unit* reporting of actual domestic hot water use. Preheated water serving the cold water inlet to showers need not be metered.

C406.2.3.5 W09 Service hot water flow reduction. *Dwelling unit, sleeping unit* and guestroom plumbing fixtures that are connected to the service water-heating system shall have a flow or consumption rating less than or equal to the values shown in Table C406.2.3.5.

TABLE C406.2.3.5—MAXIMUM FLOW RATING FOR RESIDENTIAL PLUMBING FIXTURES WITH HEATED WATER	
PLUMBING FIXTURE	MAXIMUM FLOW RATE
Faucet for private lavatory, ^a hand sinks, or bar sinks	1.2 gpm at 60 psi
Faucet for residential kitchen sink ^{a, b, c}	1.8 gpm at 60 psi
Shower head (including hand-held shower spray) ^{a, b, d}	1.8 gpm at 80 psi

For SI: 1 gallon per minute = 3.785 L/min, 1 pound per square inch = 6.89 kPa.

a. Showerheads, lavatory faucets and kitchen faucets are subject to US federal requirements listed in 10 CFR 430.32(o)–(p).

b. Maximum flow allowed is less than required by flow rates listed in 10 CFR 430.32(o)–(p) for showerheads and kitchen faucets.

c. Residential kitchen faucets may temporarily increase the flow above the maximum rate, but not above 2.2 gallons per minute at 60 psi (8.3 L/min at 414 kPa), and must default to the maximum flow rate listed.

d. Where a shower is served by multiple shower heads, the combined flow rate of all shower heads controlled by a single valve shall not exceed the maximum flow rate listed or the shower shall be designed to allow only one shower head to operate at a time.

C406.2.3.6 W10 Shower drain heat recovery. Cold water serving *building* showers shall be preheated by shower drain heat recovery units that comply with Section C404.8. The efficiency of drain heat recovery units shall be 54 percent or greater measured in accordance with CSA B55.1. Full credits are applicable to the following building uses: I-2, I-4, R-1, R-2 and also Group E where there are more than eight showers. Partial credits are applicable to *buildings* where all but ground floor showers are served where the base energy credit from Section C406.2 is adjusted by Equation 4-21.

Equation 4-21 W10 credit = W10 base energy credit × (showers with drain heat recovery/total showers in building)

C406.2.4 P01 Energy monitoring. A project can achieve energy credits for installing an energy monitoring system that complies with all the requirements of Sections C406.2.4.1 through C406.2.4.5.

C406.2.4.1 Electrical energy metering. For electrical energy supplied to the *building* and its associated site, including but not limited to site lighting, parking, recreational facilities and other areas that serve the *building* and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C406.2.4.2.

C406.2.4.2 End-use electric metering categories. Meters or other *approved* measurement devices shall be provided to collect energy use data for each end-use category indicated in Table C406.2.4.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the design load for each of the end-use categories indicated in Table C406.2.4.2 shall be permitted to be from a load that is not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual *dwelling unit* shall not require end-use metering.
2. End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet (232 m²) where a dedicated source meter complying with Section C406.2.4.3 is provided.

TABLE C406.2.4.2—ELECTRICAL ENERGY USE CATEGORIES	
LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Total HVAC system	Heating, cooling and ventilation, including but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use.
Interior lighting	Lighting systems located within the building.
Exterior lighting	Lighting systems located on the building site but not within the building.
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process load	Any single load that is not included in an HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building, including but not limited to data centers, manufacturing equipment and commercial kitchens.

TABLE C406.2.4.2—ELECTRICAL ENERGY USE CATEGORIES—continued	
LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, fireplaces, swimming pools, spas and snow-melt systems.
Electric hot water heating for uses other than space conditioning	Electricity used to generate hot water. Exception: Electric water heating with design capacity that is less than 10 percent of the building service rating.

C406.2.4.3 Electrical meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C406.2.4.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC or other building systems that can self-monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of ± 2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C406.2.4.4 and C405.2.4.5. Nonintrusive load monitoring (NILM) packages that extract energy consumption data from detailed electric wave-form analysis shall be permitted to substitute for individual meters if the equivalent data is available for collection in Section C406.2.4.4 and reporting in Section C406.2.4.5.

C406.2.4.4 Electrical energy data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly and yearly logged data for each end-use category required by Section C405.2.4.2. The data acquisition system shall have the capability of providing *building* total peak electric demand and the time(s) of day and time(s) per month at which the peak occurs. Peak demand shall be integrated over the same time period as the underlying whole-building meter reading rate.

C406.2.4.5 Graphical energy report. A permanent and readily available reporting mechanism shall be provided in the *building* for access by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C406.2.4.2 not less than every hour, day, month and year for the previous 36 months.

C406.2.5 Energy savings in lighting systems. Projects are permitted to achieve energy credits for increased lighting system performance by meeting the requirements of one of the following:

1. Section C406.2.5.2 L02.
2. Section C406.2.5.3 L03.
3. Section C406.2.5.4 L04.
4. Section C406.2.5.5 L05.
5. Section C406.2.5.6 L06.
6. Any combination of L03, L04, L05 and L06.
7. Any combination of L02, L03 and L04.

C406.2.5.1 L01 Lighting system performance (reserved). Reserved for future use.

C406.2.5.2 L02 High-end trim lighting controls. Measure credits shall be achieved where qualifying spaces are not less than 50 percent of the project interior floor area exclusive of dwelling and sleeping units. Qualifying spaces are those where general lighting is controlled by high-end trim lighting controls complying with the following:

1. The calibration adjustment equipment is located for ready access only by authorized personnel.
2. Lighting controls with ready access for users cannot increase the lighting power above the maximum level established by the high-end trim controls.
3. *Construction documents* shall state that maximum light output or power of *general lighting* in spaces contributing to the qualifying floor area shall be not greater than 85 percent of full power or light output.
4. High-end trim lighting controls shall be tested in accordance with Section

C406.2.5.2.1. The base credits from Tables C406.2(1) through C406.2(9) shall be prorated as follows:

$$\text{HET} \times [\text{Base energy credits for}$$

C406.2.5.2]/50% where:

HET = Floor area of qualifying spaces where general lighting is provided with high-end trim lighting controls complying with this section, expressed as a percentage of total interior floor area, excluding dwelling and sleeping units.

C406.2.5.2.1 High-end trim lighting control verification for L02 Additional Efficiency Credit. For the qualifying spaces associated with the project receiving the additional efficiency credits in Section C406.2.5.2, the following shall be documented while daylight responsive controls are not reducing lighting power:

1. The maximum setting for power or light output for each control group of general lighting luminaires.
2. The high-end trim setting for power or light output for each control group of general lighting luminaires.

3. For projects with seven or fewer claimed qualifying spaces, the reduction in light output or reduction in power due to high-end trim shall be tested in all spaces and shown to reduce the general lighting power or light output to not greater than 85 percent of full power or light output. For projects with more than seven claimed qualifying spaces, the reduction in light output or reduction in power due to high-end trim shall be tested in not less than 10 percent of spaces, and not less than seven spaces, and be shown to reduce general lighting power or light output to not greater than 85 percent of full power or light output. Where more than 30 percent of the tested spaces fail, the remaining qualifying spaces shall be tested.
4. Summarize the reduction in general lighting power or light output resulting from the high-end trim setting for each qualifying space and the floor area of each qualifying space.
5. Summarize the fraction of total floor area for spaces where high-end trim reduces general lighting power or light output to not greater than 85 percent of full power or light output.

C406.2.5.3 L03 Increase occupancy sensor. Lighting controls shall comply with Sections C406.2.5.3.1, C406.2.5.3.2 and C406.2.5.3.3.

C406.2.5.3.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Food preparation area.
2. Laboratory.
3. Elevator lobby.
4. Pharmacy area.
5. Vehicular maintenance area.
6. Workshop.
7. Recreation room in a facility for the visually impaired.
8. Exercise area in a fitness center.
9. Playing area in a fitness center.
10. Exam/treatment room in a health care facility.
11. Imaging room in a health care facility.
12. Physical therapy room in a health care facility.
13. Library reading area.
14. Library stacks.
15. Detailed manufacturing area.
16. Equipment room in a manufacturing facility.
17. Low-bay area in a manufacturing facility.
18. Post office sorting area.
19. Religious fellowship hall.
20. Hair salon.
21. Nail salon.
22. Banking activity area.
23. Museum restoration room.

C406.2.5.3.2 Occupant sensor control function. Occupant sensors in library stacks and laboratories shall comply with Section C405.2.1.2. Occupant sensors in elevator lobbies shall comply with Section C405.2.1.4. All other occupant sensors required by Section C406.2.5.3.1 shall comply with Section C405.2.1.1.

Exception: In spaces where an *automatic* shutoff could endanger occupant safety or security, occupant sensor controls shall uniformly reduce lighting power to not more than 20 percent of full power within 10 minutes after all occupants have left the space. Time-switch controls complying with Section C405.2.2.1 shall automatically turn off lights.

C406.2.5.3.3 Occupant sensor time delay and setpoint. Occupant sensor controls installed in accordance with Sections C405.2.1.1, C405.2.1.2, C405.2.1.3 and C405.2.1.4 shall automatically turn off lights or reduce lighting power within 10 minutes after all occupants have left the space. Occupant sensor controls installed in accordance with Section C405.2.1.2 shall have an unoccupied setpoint of not greater than 20 percent of full power.

C406.2.5.4 L04 Increased daylight area. The total daylight area of the *building* (DLA_{BLDG}) determined by Equation 4-22 shall be at least 5 percent greater than the typical daylight area (DLA_{TYP}) from Table C406.2.5.4. Credits for measure L04 shall be determined by Equation 4-23 or Equation 4-24, whichever is less:

Equation 4-22 $DLA_{BLDG} = DLZ/LFA$

where:

DLZ = The total building floor area located within sidelit and toplit daylight zones complying with Section C405.2.4.2 or C405.2.4.3 and provided with daylight responsive controls complying with Section C405.2.4.1, ft² or m².

LFA = The total building floor area used to determine the lighting power allowance in Section C405.3.2, ft² or m².

Equation 4-23 $EC_{DL} = EC_{DL5} \times 20 \times (DLA_{BLDG} - DLA_{TYP})$

where:

EC_{DL} = The lesser of actual area of daylight zones in the *building* with continuous daylight dimming, ft² or m² and (GLFA × DLA); see Table C406.2.5.4. Daylight zones shall meet the criteria in Sections C405.2.4.2 and C405.2.4.3 for primary sidelit daylight zones, secondary sidelit daylight zones and toplit daylight zones.

DLA_{TYP} = Typical percent of building area with daylight control (as a fraction) from Table C406.2.5.4.

EC_{DL5} = Section C406.2.5.4 L04 base energy credits from Section C406.2.

Equation 4-24 $EC_{DL} = EC_{DL5} \times 20 \times (DLA_{MAX} - DLA_{TYP})$

where:

EC_{DL} = The number of credits achieved by this measure.

EC_{DL5} = Section C406.2.5.4 L04 base energy credits from Section C406.2 and Tables C406.2(4), C406.2(6), C406.2(7) and C406.2(8).

DLA_{TYP} = Typical percent of building floor area with daylight control (as a fraction) from Table C406.2.5.4.

DLA_{MAX} = Maximum percent of building floor area with daylight control that can be counted for compliance with this measure, from Table C406.2.5.4.

TABLE C406.2.5.4—ADDED DAYLIGHTING PARAMETERS		
BUILDING-USE TYPE	DLA_{TYP}	DLA_{MAX}
Group B; ≤ 5,000 ft ² (460 m ²)	10%	20%
Group B; > 5,000 ft ² (460 m ²)	21%	31%
Group M; with ≤ 1,000 ft ² (900 m ²) roof area	0%	20%
Group M; with > 1,000 ft ² (900 m ²) roof area	60%	80%
Group E; education	42%	52%
Groups S-1 and S-2; warehouse	50%	70%
Groups S-1 and S-2; other than warehouse	NA	NA
NA = Not Available.		

C406.2.5.5 L05 Residential light control. In *buildings* with Group R-2 occupancy spaces, interior lighting systems shall comply with the following:

1. In *common areas*, the following space types shall have occupant sensor controls that comply with the requirements of Section C405.2.1.1:
 - 1.1. Laundry/washing areas.
 - 1.2. Dining areas.
 - 1.3. Food preparation areas.
 - 1.4. Seating areas.
 - 1.5. Exercise areas.
 - 1.6. Massage spaces.
2. In *dwelling units*, not less than one receptacle in each living room and each sleeping room shall be controlled by a switch in that room.
3. Lights and switched receptacles in bathrooms and kitchens shall be controlled by an occupant sensor complying with Section C405.2.1.1. All other lights and switched receptacles in each *dwelling unit* shall be controlled by a switch at the main entrance. The switch shall be marked to indicate its function.

Exception: Lighting and switched receptacles controlled by an occupant sensor complying with Section C405.2.1.1 are not required to be controlled by the switch at the main entrance.

C406.2.5.6 L06 Reduced lighting power. Interior lighting within all *building* areas shall comply with this section.

1. The connected interior lighting power (LP) determined in accordance with Section C405.3.1 shall be 95 percent or less than the interior lighting power allowance (LPA) determined in accordance with Section C405.3.2 using the same method used to comply with Section C405.3. Energy credits shall not be greater than four times the L06 base credit from Section C406.2 and shall be determined using Equation 4-25.
2. All permanently installed lighting serving *dwelling units* and *sleeping units*, including ceiling fan light kits and lighting integrated into range hoods and exhaust fans shall be provided by lamps with an efficacy of not less than 90 lumens per watt or by luminaires that have an efficacy of not less than 65 lumens per watt.

Exceptions:

1. Lighting integral to other appliances.

2. Antimicrobial lighting used for the sole purpose of disinfecting.

Equation 4-25 $EC_{LPA} = EC_5 \times 20 \times (LPA - LP)/LPA$

where:

EC_{LPA} = Additional energy credit for lighting power reduction.

LP = Connected interior lighting power calculated in accordance with Section C405.3.1, watts.

LPA = Interior lighting power allowance calculated in accordance with the requirements of Section C405.3.2, watts.

EC_5 = L06 base credit from Section C406.2.

C406.2.6 Efficient equipment credits. Projects are permitted to achieve energy credits using any combination of Efficient Equipment Credits Q01 through Q04.

C406.2.6.1 Q01 Efficient elevator equipment. Qualifying elevators in the *building* shall be energy efficiency class A per ISO 25745-2, Table 7. Only *buildings* three or more floors above grade may use this credit. Credits shall be prorated based on Equation 4-26, rounded to the nearest whole credit. Projects with a compliance ratio below 0.5 do not qualify for this credit.

Equation 4-26 $EC_e = EC_L \times CR_e$

where:

EC_e = Elevator energy credit achieved for the building.

EC_L = Q01 base energy credit from applicable Table C406.2(1) through Table C406.2(9).

CR_e = Compliance ratio = FA/FB .

FA = Sum of floors served by class A elevators.

FB = Sum of floors served by all building elevators and escalators.

C406.2.6.2 Q02 Efficient commercial kitchen equipment. For *buildings* and spaces designated as Group A-2, or facilities whose primary business type involves the use of a commercial kitchen where at least one gas or electric fryer is installed before the issuance of the certificate of occupancy, all fryers, dishwashers, steam cookers and ovens installed before the issuance of the certificate of occupancy shall comply with all of the following:

1. Achieve performance levels in accordance with the equipment specifications listed in Tables C406.2.6.2(1) through C406.2.6.2(4) where rated in accordance with the applicable test procedure.
2. Have associated performance levels listed on the *construction documents* submitted for permitting.

TABLE C406.2.6.2(1)—MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL FRYERS

	HEAVY-LOAD COOKING ENERGY EFFICIENCY	IDLE ENERGY RATE	TEST PROCEDURE
Standard open deep-fat gas fryers	≥ 50%	≤ 9,000 Btu/h	ASTM F1361
Standard open deep-fat electric fryers	≥ 83%	≤ 800 watts	
Large vat open deep-fat gas fryers	≥ 50%	≤ 12,000 Btu/h	ASTM F2144
Large vat open deep-fat electric fryers	≥ 80%	≤ 1,100 watts	

For SI: 1 British thermal unit per hour = 0.293 watts.

TABLE C406.2.6.2(2)—MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL STEAM COOKERS

FUEL TYPE	PAN CAPACITY	COOKING ENERGY EFFICIENCY ^a	IDLE ENERGY RATE	TEST PROCEDURE
Electric steam	3-pan	50%	400 watts	ASTM F1484
	4-pan	50%	530 watts	
	5-pan	50%	670 watts	
	6-pan and larger	50%	800 watts	
Gas steam	3-pan	38%	6,250 Btu/h	
	4-pan	38%	8,350 Btu/h	
	5-pan	38%	10,400 Btu/h	
	6-pan and larger	38%	12,500 Btu/h	

For SI: 1 British thermal unit per hour = 0.293 watts.
a. Cooking energy efficiency is based on heavy-load (potato) cooking capacity.

TABLE C406.2.6.2(3)—MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL DISHWASHERS							
MACHINE TYPE	HIGH-TEMPERATURE EFFICIENCY REQUIREMENTS			LOW-TEMPERATURE EFFICIENCY REQUIREMENTS			TEST PROCEDURE
	Idle Energy Rate ^a	Washing Energy	Water Consumption ^{n^b}	Idle Energy Rate ^a	Washing Energy	Water Consumption ^{n^b}	
Under counter	≤ 0.30 kW	≤ 0.35 kWh/rack	≤ 0.86 GPR (≤ 3.3 LPR)	≤ 0.25 kW	≤ 0.15 kWh/rack	≤ 1.19 GPR ≤ 4.5 LPR	ASTM F1696 ASTM F1920
Stationary single-tank door	≤ 0.55 kW	≤ 0.35 kWh/rack	≤ 0.89 GPR (≤ 3.4 LPR)	≤ 0.30 kW	≤ 0.15 kWh/rack	≤ 1.18 GPR ≤ 4.47 LPR	
Pot, pan and utensil	≤ 0.90 kW	kWh/rack ≤ 0.55 + 0.05 × SF _c (≤ 0.55 + 0.0046 × SM _{rack} ^c)	≤ 0.58 GPSF (≤ 2.2 LPSM)	NA	NA	NA	
Single-tank conveyor	≤ 1.20 kW	≤ 0.36 kWh/rack	≤ 0.70 GPR (≤ 2.6 LPR)	≤ 0.85 kW	≤ 0.16 kWh/rack	≤ 0.79 GPR ≤ 3.0 LPR	ASTM F1696 ASTM F1920
Multiple-tank conveyor	≤ 1.85 kW	≤ 0.36 kWh/rack	≤ 0.54 GPR (≤ 2.0 LPR)	≤ 1.00 kW	≤ 0.22 kWh/rack	≤ 0.54 GPR ≤ 2.0 LPR	
Single-tank flight type	Reported	Reported	GPH ≤ 2.975c + 55.0 (LPH ≤ 0.276d + 208)	NA	NA	NA	
Multiple-tank flight type	Reported	Reported	GPH ≤ 4.96c + 17.00 (LPH ≤ 0.461d + 787)	NA	NA	NA	
a. Idle results should be measured with the door closed and represent the total idle energy consumed by the machine, including all tank heaters and controls. The most energy-consuming configuration in the product family shall be selected to test the idle energy rate. Booster heater (internal or external) energy consumption shall be measured and reported separately, if possible, per ASTM F1696 and ASTM F1920, Sections 10.8 and 10.9, respectively. However, if booster energy cannot be measured separately, it will be included in the idle energy rate measurements. b. GPR = gallons per rack, LPR = liters per rack, GPSF = gallons per square foot of rack, LPSM = liters per square meter of rack, GPH = gallons per hour, c = [maximum conveyor belt speed (feet/minute)] × [conveyor belt width (feet)], LPH = liters per hour, d = [maximum conveyor belt speed (m/minute)] × [conveyor belt width (m)]. c. Pot, pan and utensil (PPU) washing energy is still in the format kWh/rack when evaluated; SF_{rack} (SM_{rack}) is square feet of rack area (square meters of rack area), the same as in the PPU water consumption metric.							

TABLE C406.2.6.2(4)—MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL OVENS				
FUEL TYPE	CLASSIFICATION	IDLE RATE	COOKING ENERGY EFFICIENCY, %	TEST PROCEDURE
Convection Ovens				
Gas	Full-size	≤ 12,000 Btu/h	≥ 46	ASTM F1496
Electric	Half-size	≤ 1.0 kW	≥ 71	
Electric	Full-size	≤ 1.60 kW		
Combination Ovens				
Gas	Steam mode	≤ 200 P ^a + 6,511 Btu/h	≥ 41	ASTM F2861
	Convection mode	≤ 150 P ^a + 5,425 Btu/h	≥ 56	
Electric	Steam mode	≤ 0.133 P ^a + 0.6400 kW	≥ 55	
	Convection mode	≤ 0.080 P ^a + 0.4989 kW	≥ 76	
Rack Ovens				
Gas	Single	≤ 25,000 Btu/h	≥ 48	ASTM F2093
	Double	≤ 30,000 Btu/h	≥ 52	
For SI: 1 British thermal unit per hour = 0.293 watts. a. P = Pan capacity: the number of steam table pans the combination oven is able to accommodate in accordance with ASTM F1495.				

C406.2.6.3 Q03 Efficient residential kitchen equipment. For projects with Group R-1 and R-2 occupancies, energy credits shall be achieved where all dishwashers, refrigerators and freezers comply with all of the following:

1. Achieve the Energy Star Most Efficient 2021 label in accordance with the specifications current as of:
 - 1.1. Refrigerators and freezers 5.0, 9/15/2014.
 - 1.2. Dishwashers 6.0, 1/29/2016.
2. Be installed before the issuance of the certificate of occupancy.

For Group R-1 where only some guestrooms are equipped with both refrigerators and dishwashers, the table credits shall be prorated as follows:

Equation 4-27 $\frac{[\text{Section C406.2 base credits}] \times [\text{floor area of guestrooms with kitchens}]}{[\text{total guestroom floor area}]}$

C406.2.6.4 Q04 Fault detection and diagnostics system. A project not required to comply with Section C406.2.6.4 can achieve energy credits for installing a fault detection and diagnostics system to monitor the HVAC system's performance and automatically identify faults. The installed system shall comply with Items 1 through 6 in Section C406.2.6.4.1.

C406.2.6.4.1 Fault detection and diagnostics. Buildings with a gross conditioned floor area of not less than 100,000 square feet (9290 m²) served by one or more HVAC systems that are controlled by a direct digital control (DDC) system shall include a fault detection and diagnostics (FDD) system to monitor the HVAC system's performance and automatically identify faults. The FDD system shall:

1. Include permanently installed sensors and devices to monitor HVAC system performance.
2. Sample HVAC system performance at least once every 15 minutes.
3. Automatically identify and report HVAC system faults.
4. Automatically notify authorized personnel of identified HVAC system faults.
5. Automatically provide prioritized recommendations for repair of identified faults based on analysis of data collected from the sampling of HVAC system performance.
6. Be capable of transmitting the prioritized fault repair recommendations to remotely located authorized personnel.

Exception: Group R-1 and R-2 occupancies.

C406.3 Renewable and load management credits achieved. Renewable energy and load management measures shall achieve credits as follows:

1. General measure requirements. Credits are achieved for measures installed in the *building* that comply with Sections C406.3.1 through C406.3.8.
2. Achieved credits are determined as follows:
 - 2.1. Measure credits achieved shall be determined in one of two ways, depending on the measure:
 - 2.1.1. The measure credit shall be the base credit listed by occupancy group and *climate zone* for the measure in Tables C406.3(1) through C406.3(9) where no adjustment factor or formula is shown in the description of the measure in Section C406.3.
 - 2.1.2. The measure credit shall be the base energy credit for the measure adjusted by a factor or formula as stated in the description of the measure in Section C406.3. Where adjustments are applied, each energy credit shall be rounded to the nearest whole number.
 - 2.2. Load management and renewable credits achieved for the project shall be the sum of credits for individual measures included in the project. Credits are available for the measures listed in this section.
 - 2.3. Where a project contains multiple building use groups, credits achieved for each building use group shall be summed and then weighted by the gross floor area of each building use group to determine the weighted-average project energy credits achieved.
3. Load management control requirements. The load management measures in Sections C406.3.2 (G01) through C406.3.7 (G06) require load management control sequences that are capable of and configured to automatically provide the load management operation specified based on indication of a peak period related to high short-term electric prices, grid condition or peak building load. Such a peak period shall, where possible, be initiated by a *demand response signal* from the controlling entity, such as a utility or service operator. Where communications are disabled or unavailable, all demand-responsive controls shall continue backup demand response based on a local schedule or building-demand monitoring. The local building schedule shall be adjustable without programming and reflect the electric rate peak period dates and times. The load management control sequences shall be activated for peak period control by one of the following:
 - 3.1. A certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 Specification.
 - 3.2. A device certified by the manufacturer as being capable of responding to a *demand response signal* from a certified OpenADR 2.0b VEN by automatically implementing the control functions requested by the VEN for the equipment it controls.
 - 3.3. The physical configuration and communication protocol of ANSI/CTA-2045-A or ANSI/CTA-2045-B.
 - 3.4. For air conditioners and heat pumps with two or more stages of control and cooling capacity of less than 65,000 Btu/h (19 kW), *thermostats* with a *demand responsive control* that complies with the communication and performance requirements of AHRI 1380.
 - 3.5. A device that complies with IEC 62746-10-1, an international standard for the open automated demand response system interface between the appliance, system, or energy management system and the controlling entity.
 - 3.6. An interface that complies with the communication protocol required by a controlling entity to participate in an automated demand response program.
 - 3.7. Where the controlling entity does not have a *demand response signal* available for the *building* type and size, local load management control shall be provided based on either:
 - 3.7.1. *Building* demand management controls that monitor *building* electrical demand and initiate controls to minimize monthly or peak time period demand charges.

3.7.2. A local building schedule that reflects the electric rate peak period dates and times where buildings are less than 25,000 gross square feet (2322 m²).

In this case, a binary input to the control system shall be provided that activates the demand response sequence.

TABLE C406.3(1)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP R-2, R-4 AND I-1 OCCUPANCIES

ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																			
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8	
R01	Renewable energy	C406.3.1	9	15	11	17	18	20	19	21	13	10	13	9	9	11	10	9	10	9	7	
G01	Lighting load management	C406.3.2	16	7	9	12	12	16	11	14	12	11	16	14	8	11	14	5	7	7	11	
G02	HVAC load management	C406.3.3	42	41	21	35	23	37	30	28	28	17	33	24	20	22	23	10	13	15	17	
G03	Automated shading	C406.3.4	11	x	7	18	10	13	5	13	12	2	14	7	10	13	11	1	8	8	16	
G04	Electric energy storage	C406.3.5	10	10	10	11	10	13	13	14	17	16	13	17	14	13	17	14	14	14	15	
G05	Cooling energy storage	C406.3.6	28	6	31	13	22	21	21	37	11	12	22	11	9	17	9	7	17	2	3	
G06	SHW energy storage	C406.3.7	17	17	19	18	19	19	20	20	22	19	19	21	19	19	20	18	19	18	17	
G07	Building thermal mass	C406.3.8	7	2	11	5	16	28	22	27	60	19	43	46	32	58	37	27	45	40	19	
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																						

TABLE C406.3(2)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP I-2 OCCUPANCIES

ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	6	6	6	6	6	8	7	9	8	6	8	6	6	7	7	6	7	5	4
G01	Lighting load management	C406.3.2	11	12	13	13	13	12	12	12	6	13	16	12	13	14	15	14	14	12	12
G02	HVAC load management	C406.3.3	10	11	10	10	8	21	10	10	13	11	18	11	12	14	13	12	11	9	7
G03	Automated shading	C406.3.4	1	1	1	1	x	x	x	1	x	x	2	x	x	2	x	x	1	1	x
G04	Electric energy storage	C406.3.5	13	13	13	13	14	15	14	15	15	14	15	15	14	15	15	13	14	13	12
G05	Cooling energy storage	C406.3.6	25	6	33	14	25	19	27	37	27	16	22	19	14	18	11	11	20	2	3
G06	SHW energy storage	C406.3.7	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4
G07	Building thermal mass	C406.3.8	6	2	10	4	15	25	20	24	57	18	39	44	31	53	33	25	40	34	14
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																					

TABLE C406.3(3)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP R-1 OCCUPANCIES

ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																			
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8	
R01	Renewable energy	C406.3.1	9	8	12	9	11	11	10	12	13	9	12	8	9	11	9	8	9	7	5	
G01	Lighting load management	C406.3.2	12	12	11	12	12	14	14	13	15	14	13	11	10	11	14	9	11	8	8	
G02	HVAC load management	C406.3.3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
G03	Automated shading	C406.3.4	2	2	2	3	1	2	3	2	4	3	2	1	1	1	3	1	2	1	1	
G04	Electric energy storage	C406.3.5	9	9	10	10	9	13	13	15	13	14	13	14	14	12	16	13	12	12	13	
G05	Cooling energy storage	C406.3.6	31	7	38	17	29	24	31	44	26	18	26	16	15	21	11	12	24	2	4	
G06	SHW energy storage	C406.3.7	25	25	28	26	28	29	29	30	31	29	30	31	28	29	31	26	28	25	24	
G07	Building thermal mass	C406.3.8	6	1	10	4	14	24	19	23	53	17	38	41	30	52	33	26	42	37	17	
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate																						

zone.

TABLE C406.3(4)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP B OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	14	14	17	15	17	19	18	22	24	17	22	16	14	18	18	14	17	14	11
G01	Lighting load management	C406.3.2	10	11	11	12	11	11	11	12	9	10	11	10	10	11	10	10	11	10	9
G02	HVAC load management	C406.3.3	x	10	10	9	9	3	8	12	7	12	8	11	9	10	12	8	9	10	2
G03	Automated shading	C406.3.4	4	7	7	8	7	8	5	6	6	4	6	5	4	5	5	5	5	4	7
G04	Electric energy storage	C406.3.5	14	15	14	14	16	16	17	16	18	17	16	18	17	17	18	16	15	17	18
G05	Cooling energy storage	C406.3.6	28	7	36	16	27	24	28	45	27	17	27	15	15	20	9	12	25	2	4
G06	SHW energy storage	C406.3.7	5	5	6	6	6	6	7	7	8	7	7	7	7	8	6	7	6	6	
G07	Building thermal mass	C406.3.8	3	1	5	2	6	9	6	7	14	4	11	8	9	15	5	8	12	15	7
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																					

TABLE C406.3(5)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP A-2 OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	2	2	2	2	2	2	2	3	4	2	3	2	2	3	2	2	2	2	1
G01	Lighting load management	C406.3.2	4	4	5	5	4	5	5	5	5	4	5	5	4	4	5	4	5	4	1
G02	HVAC load management	C406.3.3	32	26	37	28	31	26	27	22	23	20	17	14	19	14	10	16	14	14	1
G03	Automated shading	C406.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
G04	Electric energy storage	C406.3.5	4	4	4	4	5	5	5	5	4	4	4	4	3	4	4	4	3	3	2
G05	Cooling energy storage	C406.3.6	15	4	17	8	12	10	10	16	6	5	7	3	3	4	1	2	4	x	x
G06	SHW energy storage	C406.3.7	13	13	15	14	15	16	16	17	19	16	17	19	16	17	18	15	16	14	13
G07	Building thermal mass	C406.3.8	3	1	5	2	7	12	8	10	21	6	15	14	8	18	10	6	12	8	3
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																					

TABLE C406.3(6)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP M OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	8	8	12	9	11	12	12	17	17	11	13	9	10	11	10	9	10	9	6
G01	Lighting load management	C406.3.2	16	16	18	19	17	19	19	21	17	18	21	21	18	21	22	18	22	18	16
G02	HVAC load management	C406.3.3	x	15	16	15	15	6	15	21	13	23	15	23	17	19	26	14	17	18	3
G03	Automated shading	C406.3.4	7	11	11	12	11	13	10	11	11	7	11	11	8	10	11	8	9	8	12
G04	Electric energy storage	C406.3.5	6	10	8	10	11	12	11	10	14	11	10	12	10	11	12	11	9	10	8
G05	Cooling energy storage	C406.3.6	40	9	51	22	35	31	34	53	21	17	28	10	11	19	4	9	18	2	2
G06	SHW energy storage	C406.3.7	3	3	4	3	4	4	4	4	5	4	4	5	4	4	5	4	4	4	3
G07	Building thermal mass	C406.3.8	5	1	6	3	8	12	10	10	20	7	17	15	14	24	10	13	20	24	12
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																					

TABLE C406.3(7)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP E OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	10	11	13	12	13	16	15	21	22	15	19	15	14	17	16	13	16	12	10
G01	Lighting load management	C406.3.2	7	12	12	13	13	15	14	16	13	12	16	16	10	14	18	16	13	14	14
G02	HVAC load management	C406.3.3	18	22	32	23	25	31	26	26	20	23	31	24	20	31	12	18	27	16	9
G03	Automated shading	C406.3.4	7	13	16	12	18	17	17	18	13	12	17	17	10	15	13	14	10	16	17
G04	Electric energy storage	C406.3.5	16	16	18	17	19	21	21	23	26	22	24	24	23	24	24	20	22	19	19
G05	Cooling energy storage	C406.3.6	36	9	46	21	36	32	39	62	39	24	37	22	20	28	13	16	31	3	4
G06	SHW energy storage	C406.3.7	5	5	6	5	6	6	7	7	8	7	7	8	7	7	8	7	7	7	6
G07	Building thermal mass	C406.3.8	7	2	11	5	17	28	23	27	63	21	44	48	37	60	38	31	50	47	21
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x = Credits excluded from this building use type and climate zone.																					

TABLE C406.3(8)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP S-1 AND S-2 OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	38	37	55	45	53	53	49	58	66	36	56	38	29	41	36	24	32	23	16
G01	Lighting load management	C406.3.2	13	26	32	28	32	35	36	33	36	31	27	37	32	23	28	36	22	25	22
G02	HVAC load management	C406.3.3	18	46	37	37	28	36	29	26	22	23	17	12	16	13	5	14	8	10	3
G03	Automated shading	C406.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
G04	Electric energy storage	C406.3.5	40	40	47	41	47	44	40	44	42	30	38	31	21	31	26	24	29	23	21
G05	Cooling energy storage	C406.3.6	20	5	21	11	14	14	11	21	5	5	9	2	2	5	1	1	3	x	x
G06	SHW energy storage	C406.3.7	3	3	3	3	4	3	4	4	4	3	4	4	3	3	4	2	2	2	2
G07	Building thermal mass	C406.3.8	7	2	12	5	17	29	23	28	66	18	44	47	28	56	37	20	39	29	13
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. x indicates measure is not available for building occupancy in that climate zone.																					

TABLE C406.3(9)—RENEWABLE AND LOAD MANAGEMENT CREDITS FOR OTHER ^a OCCUPANCIES																					
ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	12	13	16	14	16	18	17	20	21	13	18	13	12	15	14	11	13	10	8
G01	Lighting load management	C406.3.2	11	13	14	14	14	16	15	16	14	14	16	16	13	14	16	14	13	12	12
G02	HVAC load management	C406.3.3	24	24	23	22	20	23	21	21	18	18	20	17	16	18	14	13	14	13	6
G03	Automated shading	C406.3.4	5	6	7	9	8	9	7	9	8	5	9	7	5	8	7	5	6	6	9
G04	Electric energy storage	C406.3.5	14	15	16	15	16	17	17	18	19	16	17	17	15	16	17	14	15	14	14
G05	Cooling energy storage	C406.3.6	28	7	34	15	25	22	25	39	20	14	22	12	11	17	7	9	18	2	3
G06	SHW energy storage	C406.3.7	9	9	11	10	11	11	11	12	13	11	12	13	11	11	12	10	11	10	9
G07	Building thermal mass	C406.3.8	6	2	9	4	13	21	16	20	44	14	31	33	24	42	25	20	33	29	13
HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water. a. Other occupancy groups include all Groups except for Groups A-2, B, E, I, M and R.																					

C406.3.1 R01 Renewable energy. Projects installing on-site renewable energy systems with a capacity of at least 0.1 watts per gross square foot (1.08 W/m²) of *building area* or securing off-site renewable energy shall achieve energy credits for this measure calculated as follows:

$$\text{Equation 4-28 } EC_R = EC_{0.1} \times (R_L + R_{off} - R_{ex}) / (0.1 \times PGFA) \text{ where:}$$

EC_R = Section C406.3.1 R01 energy credits achieved for this project.

$EC_{0.1}$ = Section C406.3.1 R01 base credits from Tables C406.3(1) through C406.3(9).

R_t = Actual total rating of on-site renewable energy systems (W).

R_{off} = Actual total equivalent rating of off-site renewable energy contracts (W), calculated as follows:

$$R_{off} = TRE / (REN \times 20)$$

where:

TRE = Total off-site renewable electrical energy in kilowatt-hours (kWh) that is procured in accordance with Sections C406.3.1.1.2.1 through C406.3.1.1.4.

REN = Annual off-site renewable electrical energy from Table C406.3.1.1.2, in units of kilowatt-hours per watt of array capacity.

R_{ex} = Rating (W) of renewable energy resources capacity excluded from credit calculated as follows:

$$R_{ex} = RR_r + RR_x + RR_c$$

where:

RR_r = Rating of on-site renewable energy systems required by Section C406.3.1.1.1, without exception (W).

RR_x = Rating of renewable energy resources used to meet any exceptions of this code (W).

RR_c = Rating of renewable energy resources used to achieve other energy credits in Section C406 (W).

$PGFA$ = Project gross floor area, ft². Where renewable requirements, exceptions or credits are expressed in annual kWh or Btu rather than watts of output capacity, they shall be converted as 3,413 Btu = 1 kWh and converted to W equivalent capacity as follows:

RR_w = Actual total equivalent rating of renewable energy capacity (W), calculated as follows:

$$RR_w = TRE_x / (REN \times PGFA)$$

where:

TRE_x = Total renewable energy in kilowatt-hours (kWh) that is excluded from R01 energy credits.

C406.3.1.1 Renewable energy systems. *Buildings* in Climate Zones 0 through 7 shall comply with Sections C406.3.1.1.1 through C406.3.1.1.4.

C406.3.1.1.1 On-site renewable energy systems. *Buildings* shall be provided with on-site renewable electricity generation systems with a direct current (DC) nameplate power rating of not less than 0.75 watts per square foot (8.1 W/m²) multiplied by the sum of the gross conditioned floor area of all floors, not to exceed the combined gross conditioned floor area of the three largest floors.

Exceptions: The following *buildings* or building sites shall comply with Section C406.1.1.2:

1. A *building site* located where an unshaded flat plate collector oriented toward the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 1.1 kBtu/ft² per day (3.5 kWh/m²/day).
2. A *building* where more than 80 percent of the roof area is covered by any combination of permanent obstructions such as, but not limited to, mechanical equipment, vegetated space, access pathways or occupied roof terrace.
3. Any *building* where more than 50 percent of the roof area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the *building* for more than 2,500 annual hours between 8:00 a.m. and 4:00 p.m.
4. A *building* with gross conditioned floor area less than 5,000 square feet (465 m²).

C406.3.1.1.2 Off-site renewable energy. *Buildings* that qualify for one or more of the exceptions to Section C406.3.1.1.1 or do not meet the requirements of Section C406.3.1.1.1 with an on-site renewable energy system shall procure off-site renewable electrical energy, in accordance with Sections C406.3.1.1.1 and C406.3.1.1.2.2, that shall be not less than the total off-site renewable electrical energy determined in accordance with Equation 4-29.

Equation 4-29 $TRE_{off} = (REN_{off} \times 0.75 \text{ W/ft}^2 \times FLRA -$

$IRE_{on}) \times 15$ where:

TRE_{off} = Total off-site renewable electrical energy in kilowatt-hours (kWh) to be procured in accordance with Table C406.3.1.1.2.

REN_{off} = Annual off-site renewable electrical energy from Table C406.3.1.1.2, in units of kilowatt-hours per watt of array capacity.

$FLRA$ = The sum of the gross conditioned floor area of all floors not to exceed the combined floor area of the three largest floors.

IRE_{on} = Annual on-site renewable electrical energy generation of a new on-site renewable energy system, to be installed as part of the building project, whose rated capacity is less than the rated capacity required in Section C406.3.1.1.1.

TABLE C406.3.1.1.2—ANNUAL OFF-SITE RENEWABLE ENERGY REQUIREMENTS	
CLIMATE ZONE	ANNUAL OFF-SITE RENEWABLE ELECTRICAL ENERGY (kWh/W)
1A, 2B, 3B, 3C, 4B and 5B	1.75
0A, 0B, 1B, 2A, 3A and 6B	1.55
4A, 4C, 5A, 5C, 6A and 7	1.35

C406.3.1.1.2.1 Off-site procurement. The building owner, as defined in the *Florida Building Code, Building*, shall procure and be credited for the total amount of off-site renewable electrical energy, not less than required in accordance with Equation 4-29, with one or more of the following:

1. Physical renewable energy power purchase agreement.
2. Financial renewable energy power purchase agreement.
3. Community renewable energy facility.
4. Off-site renewable energy system owned by the building property owner.
5. Renewable energy investment fund.
6. Green retail tariff.

The generation source shall be located where the energy can be delivered to the *building site* by any of the following:

1. Direct connection to the off-site renewable energy facility.
2. The local utility or distribution entity.
3. An interconnected electrical network where energy delivery capacity between the generator and the build-ing site is available.

C406.3.1.1.2.2 Off-site contract. The renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 10 years. The contract shall be structured to survive a partial or full trans-fer of ownership of the building property.

C406.3.1.1.3 Renewable energy certificate (REC) documentation. The property owner or owner's authorized agent shall demonstrate that where renewable energy certificates (RECs) or energy attribute certificates (EACs) are associated with on-site and off-site renewable energy production required by Sections C406.3.1.1.1 and C406.3.1.1.2, all of the following criteria for RECs and EACs shall be met:

1. The RECs and EACs are retained and retired by or on behalf of the property owner or tenant for a period of not less than 15 years or the duration of the contract in Section C406.3.1.1.2.2, whichever is less.
2. The RECs and EACs are created within a 12-month period of the use of the REC.
3. The RECs and EACs are from a generating asset placed in service not more than five years before the issuance of the certificate of occupancy.

C406.3.1.1.4 Renewable energy certificate purchase. A *building* that qualifies for one or more of the exceptions to Section C406.3.1.1.1, and where it can be demonstrated to the *code official* that the requirements of Section C406.3.1.1.2 cannot be met, the building owner shall contract the purchase of renewable electricity products before the certificate of occupancy is issued. The purchase of renewable electricity products shall comply with the Green-e Energy National Standard for renew-able electricity products equivalent to five times the amount of total off-site renewable energy calculated in accordance with Equation 4-29.

C406.3.2 G01 Lighting load management. A project can achieve energy credits for installing demand-responsive lighting controls for interior *general lighting* that comply with Section C406.3.2.1. The demand-responsive lighting controls shall automat-ically reduce the light output or power of controlled lighting to not more than 80 percent of full output, or 80 percent of the *high-end trim* setpoint, whichever is less. Energy credits can be earned where demand-responsive lighting controls are installed for the following:

1. Not less than 10 percent of the interior floor area in Group R or I occupancies.
2. Not less than 50 percent of the interior floor area in all other occupancies.

G01 credits shall be prorated using Equation 4-30 with not more than 75 percent of the interior floor area being counted.

Equation 4-30 [interior floor area with lighting load management, %] × [table credits for Section C406.3.2]/75%

C406.3.2.1 Demand responsive lighting controls function. Demand responsive controls for lighting shall be capable of the following:

1. Automatically reducing the output of controlled lighting to 80 percent or less of full power or light output upon receipt of a demand response signal.
2. Where high-end trim has been set, automatically reducing the output of controlled lighting to 80 percent or less of the high-end trim setpoint upon receipt of a demand response signal.
3. Dimming controlled lights gradually and continuously over a period of not longer than 15 minutes to achieve their demand response setpoint.

4. Returning controlled lighting to its normal operational settings at the end of the demand response period.

Exception: Storage rooms and warehouse storage areas shall be permitted to switch off 25 percent or more of general lighting power rather than dimming.

C406.3.3 G02 HVAC load management. *Automatic* load management controls shall be configured as follows:

1. Cooling temperature shift: Where electric cooling is in use, controls shall gradually increase the cooling setpoint by at least 3°F (1.7°C) over a minimum of 3 hours or reduce effective cooling capacity to 60 percent of installed capacity during the peak period or adjust the cooling temperature setpoint as described in Section C403.4.4.
2. Heating temperature shift: Where electric heating is in use, controls shall gradually decrease the heating setpoint by at least 3°F (1.7°C) over a minimum of 3 hours or reduce effective heating capacity to 60 percent of installed capacity during the peak period or adjust the heating temperature setpoint as described in Section C403.4.4.
3. Ventilation shift: Where HVAC systems serve multiple zones and have less than 70 percent outdoor air required, include controls that provide excess outdoor air preceding the peak period and reduce outdoor air by at least 30 percent during the peak period, in accordance with ASHRAE Standard 62.1, Section 6.2.5.2 or the provisions for approved engineering analysis in Section 403.3.1.1 of the *Florida Building Code, Mechanical*.

Credits achieved for measure G02 shall be calculated as follows:

Equation 4-31 $EC_{G02_ach} = EC_{G02_base} \times EC_{G02_adj}$

where:

EC_{G02_ach} = Demand responsive control credit achieved for project.

EC_{G02_base} = G02 Base energy credit from Section C406.3.

EC_{G02_adj} = Energy credit adjustment factor from Table C406.3.3.

TABLE C406.3.3—ENERGY CREDIT ADJUSTMENT BASED ON USE OF VENTILATION SHIFT OR DEMAND RESPONSE

DEMAND RESPONSE SIGNAL AVAILABLE ^a	DEMAND RESPONSE REQUIRED BY SECTION C403.4.6.1 ^b	INCLUDES VENTILATION SHIFT ^c	EC_{G02_adj}
No	No	Yes	100%
No	Yes	Yes	80%
Yes	No	Yes	80%
Yes	Yes	Yes	40%
No	No	No	70%
No	Yes	No	50%
Yes	No	No	50%
Yes	Yes	No	0%

a. "Demand Response Signal Available" is "Yes" where a controlling entity other than the owner makes a demand response signal available to the building.

b. Where the exception is invoked in Section C403.4.6.1 for buildings that comply with Load Management measure G02, then "Demand Response Required" is "Yes."

c. Ventilation shift controls in accordance with Section C406.3.3, Item 3.

C406.3.4 G03 Automated shading load management. Where *fenestration* on east, south and west exposures is greater than 20 percent of the wall area, load management credits shall be achieved as follows:

1. *Automatic* exterior shading devices or *dynamic glazing* that is capable of reducing solar gain through sunlit *fenestra-tion* by not less than 50 percent when fully closed shall receive the full credits in Tables C406.3(1) through C406.3(9). The exterior shades shall have fully open and fully closed *solar heat gain coefficient* (SHGC) determined in accordance with AERC 1.
2. *Automatic* interior shading devices with a solar reflectance of not less than 0.50 for the surface facing the *fenestration* shall receive 40 percent of the credits in Tables C406.3(1) through C406.3(9).
3. All shading devices, *dynamic glazing* or shading attachments shall:
 - 3.1. Provide not less than 90 percent coverage of the total *fenestration* on east, south and west exposures in the *building* to achieve the credits determined in Item 1 or 2. Alternatively, provide not less than 70 percent cover-age of the total *fenestration* on the south and west exposures in the *building* to achieve 50 percent of the credits determined in Item 1 or 2.
 - 3.2. Be automatically controlled and shall modulate in multiple steps or continuously the amount of solar gain and light transmitted into the space in response to peak periods and either daylight levels or solar intensity.
 - 3.3. Include a *manual* override located in the same *enclosed space* as the shaded vertical *fenestration* that shall override operation of *automatic* controls for not longer than 4 hours. Such override shall be locked out during peak periods.

For this section, directional exposures shall exclude *fenestration* that has an orientation deviating by more than 45 degrees of facing the cardinal direction. In the southern hemisphere, where the south exposure is referred to, it shall be replaced by the north exposure.

C406.3.5 G04 Electric energy storage. Electric storage devices shall be charged and discharged by *automatic* load management controls to store energy during nonpeak periods and use stored energy during peak periods to reduce *building* demand. Electric storage devices shall have a minimum capacity of 1.5 watt-hours per square foot (Wh/ft²) (16 Wh/m²) of gross *building* area. Base credits in Tables C406.3(1) through C406.3(9) are based on installed electric storage of 5 Wh/ft² (54 Wh/m²) and shall be prorated for actual installed storage capacity between 1.5 and 15 Wh/ft² (16 to 161 Wh/m²), as follows:

Equation 4-32
$$\text{Installed electric storage capacity, Wh/ft}^2 \text{ (Wh/m}^2\text{)} / 5(54) \times [\text{table credits for Section C406.3.5}]$$

Larger energy storage shall be permitted; however, credits are limited to the range of 1.5 to 15 Wh/ft² (16 to 161 Wh/m²).

C406.3.6 G05 Cooling energy storage. *Automatic* load management controls shall be capable of activating ice or chilled water storage equipment to reduce demand during summer peak periods. Storage tank standby loss shall be demonstrated through analysis to be not more than 2 percent of storage capacity over a 24-hour period for the cooling design day. Base credits in Section C406.3 are based on storage capacity of the design peak hour cooling load with a 1.15 sizing factor. Credits shall be prorated for installed storage systems sized between 0.5 and 4.0 times the design day peak hour cooling load, rounded to the nearest whole credit. Larger storage shall be permitted but the associated credits are limited to the range provided in this section. Energy credits shall be determined as follows:

Equation 4-33
$$EC_s = EC_{1.0} \times (1.44 \times SR + 0.71) / 2.15$$

where:

EC_s = Cooling storage credit achieved for project.

$EC_{1.0}$ = G05 base energy credit for building use type and climate zone based on 1.0 ton-hours storage per design day ton (kWh/kW) of cooling load.

SR = Storage ratio in ton-hours storage per design day ton (kWh/kW) of cooling load where $0.5 \leq SR \leq 4.0$.

C406.3.7 G06 Service hot water energy storage. Where service hot water (SHW) is heated by electricity, *automatic* load management controls complying with ANSI/CTA-2045-B shall preheat stored SHW before the peak period and suspend electric water heating during the peak period. Storage capacity shall be provided by either:

1. Preheating water above 140°F (60°C) delivery temperature with at least 1.34 kWh of energy storage per kW of water-heating capacity. Tempering valves shall be provided at the *water heater* delivery location.
2. Providing additional heated water tank storage capacity above peak SHW demand with equivalent peak storage capacity to Item 1.

Credits earned for measure G06 shall be calculated using Equation 4-34:

Equation 4-34
$$EC_{G06\ ach} = EC_{G06\ base} \times EC_{G06\ adj}$$

where:

$EC_{G06\ ach}$ = SHW energy storage credit achieved for project.

$EC_{G06\ base}$ = G06 Base energy credit from Section C406.3.

$EC_{G06\ adj}$ = Energy credit adjustment factor from Table C406.3.7.

TABLE C406.3.7—ENERGY CREDIT ADJUSTMENT BASED ON USE OF HEAT PUMP WATER HEATER OR DEMAND RESPONSE			
DEMAND RESPONSE READY PER SECTION C404.10	DEMAND RESPONSE SIGNAL AVAILABLE ^a	HAS HPWH	$EC_{G06\ adj}^b$
No	NA	No	100%
No	NA	Yes	33%
Yes	No	No	50%
Yes	No	Yes	17%
Yes	Yes	NA	0%

HPWH = Heat Pump Water Heater, NA = Not available.

a. "Demand Response Signal Available" is "Yes" where a controlling entity currently makes a demand response signal available to the building.

b. The lower values of $EC_{G06\ adj}$ in this column apply where not less than 67 percent of the whole-building design end use service water heating requirements are met using only heat pump heating at the conditions described in Section C406.2.3.1.2.

C406.3.8 G07 Building thermal mass. The project shall have additional passive interior mass and a night flush control of the HVAC system. The credit is available to projects that have at least 80 percent of gross floor area unoccupied between midnight and 6:00 a.m. The project shall meet the following requirements:

1. Interior to the *building thermal envelope* insulation, provide 10 pounds per foot (15 kg/m) of project *conditioned floor area* of passive thermal mass in the *building* interior wall, the inside of the *exterior wall* or the interior floor construction. Mass construction shall have mass surfaces directly contacting the air in *conditioned spaces* with directly attached

gypsum panels allowed. Mass with carpet or furred gypsum panels or exterior wall mass that is on the exterior of the insulation layer [e.g., the portion of concrete masonry unit (CMU) block on the exterior of insulation-filled cell cavities] shall not be included toward the building mass required.

2. HVAC units for 80 percent or more of the supply airflow in the project shall be equipped with outdoor air economizers and fans that have variable or low speed capable of operating at 66 percent or lower airflow and be included in the night flush control sequence.
3. Night flush controls shall be configured with the following sequence or another night flush strategy shall be permitted where demonstrated to be effective, avoids added morning heating and is *approved* by the authority having jurisdiction.
 - 3.1. Summer mode shall be activated when outdoor air temperature exceeds 70°F (21°C) and shall continue uninterrupted until deactivated when outdoor air temperature falls below 45°F (7°C). During summer mode, the occupied cooling setpoint shall be set 1°F (0.6°C) higher than normal and the occupied heating setpoint shall be reset 2°F (1.1°C) lower than normal.
 - 3.2. Where all the following conditions exist, night flush shall be activated:
 - 3.2.1. Summer mode is active in accordance with Item 3.1.
 - 3.2.2. Outdoor air temperature is 5°F (2.8°C) or more below indoor average zone temperature.
 - 3.2.3. Indoor average zone temperature is greater than morning occupied heating setpoint.
 - 3.2.4. In Climate Zones 0A, 1A, 2A and 3A, outdoor dewpoint is below 50°F (10°C) or outdoor air enthalpy is less than indoor air enthalpy.
 - 3.2.5. Local time is between 10:00 p.m. and 6:00 a.m.
 - 3.3. When night flush is active, *automatic* night flush controls shall operate outdoor air economizers at low fan speed not exceeding 66 percent during the unoccupied period with mechanical cooling and heating locked out.

Information provided by the proponent:

The 2023 FBC-EC has already lagged the 2021 IECC additional efficiency requirements. If Section C406 from IECC2024 is fully adopted, this change would make the 2026 FBC-EC equivalent to the ASHRAE 90.1-2022.

Additional cost to construction: Minimal.

Modification EN12307: Revise demand control ventilation (DCV) requirements. Modified the minimum floor area threshold for the DCV requirement by climate zones. Increase the DCV stringency for climate zones 1A and 2A.

~~C403.2.6.1 Demand-controlled ventilation.~~ Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (46.5 m²) and with an average occupant load of 25 people per 1,000 square feet (93 m²) of floor area (as established in Table 403.3.1.1 of the *Florida Building Code, Mechanical*) and served by systems with one or more of the following:

- ~~1. An air-side economizer.~~
- ~~2. Automatic modulating control of the outdoor air damper.~~
- ~~3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).~~

Exception: Demand control ventilation is not required for systems and spaces as follows:

- ~~1. Systems with energy recovery complying with Section C403.2.7.~~

2. Multiple-zone systems without direct digital control of individual zones communicating with a central control panel.
3. Systems with a design outdoor airflow less than 1,200 cfm (566 L/s).
4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (566 L/s).
5. Ventilation provided for process loads only.

C403.2.6.1 Demand control ventilation. Demand control ventilation (DCV) shall be provided for the following:

1. Spaces with *ventilation* provided by single-zone systems where an air-side economizer is provided in accordance with **Section C403.3.3.**
2. Spaces larger than 250 square feet (23 m²) in Climate Zones 5A, 6, 7, and 8 and spaces larger than 500 square feet (46.5 m²) in other *climate zones* that have a design occupant load of 15 people or greater per 1,000 square feet (93 m²) of floor area, as established in **Table 403.3.1.1** of the *Florida Building Code, Mechanical*, and are served by systems with one or more of the following:
 - 2.1. An air-side economizer.
 - 2.2. *Automatic* modulating control of the outdoor air damper.
 - 2.3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).

Exceptions:

1. Spaces served by systems with energy recovery in accordance with **Section C403.2.7** and that have a floor area less than:.
 - 1.1. 6,000 square feet (557 m²) in Climate Zone 3C.
 - 1.2. 2,000 square feet (186 m²) in Climate Zones 1A, 3B and 4B.
 - 1.3. 1,000 square feet (93 m²) in Climate Zones 2A, 2B, 3A, 4A, 4C, 5 and 6.
 - 1.4. 400 square feet (37 m²) in Climate Zones 7 and 8.
2. Multiple-zone systems without *direct digital control* of individual zones communicating with a central control panel.
3. Spaces served by multiple-zone systems with a design outdoor airflow less than 750 cfm (354 L/s).
4. Spaces where more than 75 percent of the space design outdoor airflow is required for makeup air that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces.
5. Spaces with one of the following occupancy classifications as defined in **Table 403.3.1.1** of the *Florida Building Code, Mechanical*: correctional cells, education laboratories, barber, beauty and nail salons, and bowling alley seating areas.
6. Spaces where the *registered design professional* demonstrates an engineered ventilation system design that:
 - 6.1. Prevents the maximum concentration of contaminants from being more than that obtainable by the required rate of outdoor air *ventilation* .
 - 6.2. Allows the required minimum design rate of outdoor air to be reduced by not less than 15 percent.

Information provided by the proponent:

Spaces served with heat recovery exemptions are based on climate zone and floor area; the exception now applies to smaller floor areas only and is, hence, more restrictive. Increase the DCV stringency for climate zones 1A and 2A. FSEC conducted cost-

benefit analysis and determined that this change is cost-effective.

Additional cost to construction:

Construction cost increase; however, a cost-effective modification

Modification EN12136: Maintains consistency with 2024 IECC residential prescriptive tables.

Amend Tables R402.1.2 and R402.1.4 to align with the 2024 IECC as follows:

TABLE R402.1.2 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	VERTICAL FENESTRATION U-FACTOR ^{h,j}	SKYLIGHT U-FACTOR ^h	GLAZED FENESTRATION SHGC ^{b,e}	SKYLIGHT SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE ^a	MASONRY WALL R-VALUE ^d	FLOOR R-VALUE ^b	BASEMENT WALL R-VALUE ^{b,e}	UNHEATED SLAB ^d R-VALUE & DEPTH ^a	HEATED SLAB ^b R-VALUE & DEPTH ^c	CRAWL SPACE ^e WALL R-VALUE ^{b,e}
1	NR	0.75 60	0.25	0.28	30	13 or 0&1 0ci	3/4	13 or 7+ 5ci or 10 ci	0	0	R-5ci edge & R-5 full slab	0
2	0.40	0.65 0	0.25	0.28	38	13 or 0&1 0ci	4/6	14 3 or 7+ 5ci or 10 ci	0	0	R-5ci edge & R-5 full slab	0

For Sl: 1 foot = 304.8mm.

R-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

- b. ~~The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.~~ “5ci or 13” means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “10ci or 13” means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “15ci or 19 or 13&5ci” means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- c. ~~“15/19” means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. “15/19” shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. “10/13” means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall. Slab insulation shall be installed in accordance with Section R402.2.10.1.~~
- d. ~~R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs. Basement wall insulation is not required in Warm Humid locations as defined by Figure R301.1 and Table R301.1.~~
- e. ~~There are no SHGC requirements in the Marine Zone. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.~~
- f. ~~Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1. Mass walls shall be in accordance with Section R402.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.~~
- g. ~~Or insulation sufficient to fill the framing cavity, R-19 minimum. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and~~
 - Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation.
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.
- h. ~~The first value is cavity insulation, the second value is continuous insulation, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation. “30 or 19+7.5ci or 20ci” means R-20 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.~~
- i. ~~The second *R*-value applies when more than half the insulation is on the interior of the mass wall.~~
- ji. For impact rated fenestration complying with Section R301.2.1.2 of the *Florida Building Code, Residential* or Section 1609.1.2 of the *Florida Building Code, Building*, the maximum *U*-factor shall be 0.65 in Climate Zone 2.

TABLE R402.1.4 EQUIVALENT U-FACTORS

CLIMATE ZONE	VERTICAL FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	WOOD FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	UNHEATED SLAB F-FACTOR ^d	HEATED SLAB F-FACTOR ^d	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75 60	0.03 5	0.08 4	0.197	0.06 4	0.360	0.73	0.74	0.47 7
2	0.40	0.65 0	0.03 0	0.08 4	0.165	0.06 4	0.360	0.73	0.74	0.47 7

- a. Nonfenestration *U*-factors and F-factors shall be obtained from measurement, calculation, ~~or an approved source, or Appendix RF where such appendix is adopted or approved.~~
- b. Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- c. ~~Basement wall U-factor of 0.360 in~~ warm-humid locations as defined by Table R301.1-, the basement wall U-factor shall not exceed 0.360.
- d. A maximum U-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation above sea level, or
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the International Residential Code.
- e. F-Factors for slabs shall correspond to the R-values in Table R402.1.2 and the installation conditions of Section R402.2.10.1.

Information provided by the proponent:

This proposal updates the prescriptive envelope requirements to maintain consistency with the 2024 IECC. For the most part, these modifications add compliance options without changing stringency. The 2024 IECC now has different rows for skylight SHGC and heated and unheated slabs. This proposal incorporates these distinctions, while maintaining the style (columns) included in the 2023 Florida Building Code, Energy Conservation, Eighth Edition. This proposal also includes moderate improvements to the skylight U-factor requirements. Finally, this proposal maintains the footnote to Table R402.1.2 that allows a maximum U-factor of 0.65 in Climate Zone 2 for impact rated fenestration complying with Section R301.2.1.2 of the Florida Building Code, Residential, or Section 1609.1.2 of the Florida Building Code, Building.

Additional cost to construction: Little to no cost impact.

Modification EN12304: Inserts language similar to IECC 2024 for quality assurance of installed mechanical ventilation systems.

R403.6.3 Testing. Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6, in accordance with ANSI/RESNET/ICC 380. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

Exceptions:

1. Kitchen range hoods that are ducted to the outside with ducting having a diameter of 6 inches (152 mm) or larger, a length of 10 feet (3028 mm) or less, and not more than two 90-degree (1.57 rad) elbows or equivalent shall not require testing.
2. A third-party test shall not be required where the ventilation system has an integrated diagnostic tool used for

- airflow measurement, and a user interface that communicates the installed airflow rate.
- Where tested in accordance with Section R403.6.4, testing of each mechanical ventilation system is not required.

R403.6.4 Unit sampling. For *buildings* with eight or more *dwelling units* or *sleeping units*, the mechanical *ventilation* systems in the greater of seven units or 20 percent of the total units shall be tested. Tested systems shall include systems in a top floor unit, systems in a ground floor unit, systems in a middle floor unit, and the systems in the *dwelling unit* or *sleeping unit* with the largest *conditioned floor area*. Where *buildings* have fewer than eight *dwelling units* or *sleeping units*, the mechanical *ventilation* systems in each unit shall be tested. Where the *ventilation* flow rate of a mechanical *ventilation* system is less than the minimum permitted rate, corrective actions shall be taken and the system retested until it passes. For each tested *dwelling unit* or *sleeping unit* system with a *ventilation* flow rate lower than the minimum permitted, three additional systems, including the corrected system, shall be tested.

R403.6.5 Intermittent exhaust control for bathrooms and toilet rooms. Where an exhaust system serving a bathroom or toilet room is designed for intermittent operation, the exhaust system controls shall include one or more of the following:

- A timer control with one or more delay setpoints that automatically turns off exhaust fans when the selected setpoint is reached. Not fewer than one delay-off setpoint shall be 30 minutes or less.
- An *occupant sensor control* with one or more delay setpoints that automatically turns off exhaust fans in accordance with the selected delay setpoint after all occupants have vacated the space. Not fewer than one delay-off setpoint shall be 30 minutes or less.
- A humidity control with an adjustable setpoint ranging between 50 percent or more and 80 percent or less relative humidity that automatically turns off exhaust fans when the selected setpoint is reached.
- A contaminant control that responds to a particle or gaseous concentration and automatically turns off exhaust fans when a design setpoint is reached.

Manual off functionality shall not be used in lieu of the minimum setpoint functionality required by this section.

Exception: Bathroom and toilet room exhaust systems serving as an integral component of an outdoor air *ventilation* system or a whole-house mechanical *ventilation* system.

Information provided by the proponent:

Research conducted for FBC indicated systems were not operating as designed. This testing requirement, that energy raters are qualified to do, will provide some assurance that the home builder and home buyer are obtaining the system that was designed. This language is from the 2024 IECC.

Additional cost to construction: Slight increase in first cost to pay for test.

Modification EN12135: Modify ratio of proposed to reference loads.

R405.3 Performance-based compliance.

Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have annual total normalized Modified Loads that are less than or equal to 95 85 percent of the annual total loads of the *standard reference design* as calculated in accordance with Appendix RC of this standard.

Table R405.5.2(1)

SPECIFICATONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Portions of the table not show remain unchanged.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
	Foundation wall <i>U</i> -factor and slab <i>F</i> -factor: as specified in Table R402.1.2.	

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Opaque doors	Area: 40 ft ² .	As proposed.
	Orientation: North.	As proposed.
	U-factor: same as fenestration as specified in Table R402.1.2 .	As proposed.
Vertical fenestration other than opaque doors	Total area ^h = (a) The proposed glazing area, where the proposed glazing area is less than 15 percent of the conditioned floor area. (b) 15 percent of the conditioned floor area, where the proposed glazing area is 15 percent or more of the conditioned floor area.	As proposed.
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed.
	U-factor: as specified in Table R402.1.2.	As proposed.
	SHGC: as specified in Table R402.1.2 except for climate zones without an SHGC requirement, the SHGC shall be equal to 0.40.	As proposed.
	Interior shade fraction: 0.92 – (0.21 × SHGC for the standard reference design).	Interior shade fraction: 0.92 – (0.21 × SHGC as proposed).
	External shading: none	As proposed.
Skylights	None Total area ^h = (a) The proposed skylight area, where the proposed skylight area is less than 16 ft ² . (b) 16 ft ² , where the proposed skylight area is 16 ft ² t or greater. Orientation: As proposed. U-factor: as specified in Table R402.1.2. SHGC: as specified in Table R402.1.2 except for climate zones without an SHGC requirement, the SHGC shall be equal to 0.40.	As proposed.

Information provided by the proponent:

This will maintain stringency with IECC 2024 and will save significant energy in new Florida homes.

Additional cost to construction:

There is great flexibility in how to achieve compliance such that one or more methods should prove a positive benefit to cost to property owner.

Modification P11719: The proposed modification is to reverse the commission's action to permit plastic hangers for fuel gas piping.

407.2 Design and installation. Piping shall be supported with metal pipe hooks, metal pipe straps, metal bands, metal brackets, metal hangers or building structural components, suitable for the size of piping, of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration. Piping shall be anchored to prevent undue strains on connected appliances and shall not be supported by other piping. Pipe hangers and supports shall conform to the requirements of MSS SP-58 and shall be spaced in accordance with Section 415. Supports, hangers and anchors shall be installed so as not to interfere with the free expansion and contraction of the piping between anchors. All parts of the supporting equipment shall be designed and installed so that they will not be disengaged by movement of the supported piping.

Information provided by the proponent:

The 2024 IFGC made the change to omit the requirement for metal hangers for fuel gas piping. The consent agenda for the 2027 IFGC includes a proposed change from the PMGCAC to reverse this change (See FG-6 in support file). I am submitting this proposal to avoid making a change in Florida that will be reversed in three years when we come together again to look at the 2027 changes.

Additional cost to construction:

Metal hangers are slightly more expensive than plastic hangers so the proposal will marginally increase the cost of installing fuel gas pipes in Florida. However, since the code currently requires metal hangers, the cost will not change from the cost of current practices.

Florida Building Code, Mechanical

Modification M11775: Requires insulation for condensate piping located inside a building's unconditioned space.

307.2.2 Drain pipe materials and sizes.

Components of the condensate disposal system shall be ABS, cast iron, copper and copper alloy, CPVC, cross-linked polyethylene, galvanized steel, PE-RT, polyethylene, polypropylene, PVC or PVDF pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the Florida Building Code, Plumbing relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch (19.1 mm) pipe size and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 307.2.2. Drain pipes conveying condensate from cooling coils and evaporators shall be insulated with a minimum of R-3 when located inside a building's unconditioned space.

Information provided by the proponent:

Uninsulated condensate piping carries a cold fluid, condensate water from cooling coils. The moisture that is present in unconditioned spaces condensates on the pipes exterior surface and can drip onto walls and ceilings. This drip can cause water damage and support the growth of mold inside the building.

Additional cost to construction:

Minimal impact. Insulating condensate piping is common. Pipe insulation is relatively inexpensive.

Florida Building Code, Residential

Modification M11776: This proposed modification clarifies the code regarding the insulation of condensate piping. Insulating the condensate piping is a common practice but it is not clearly mandated in the codes.

M1411.3.2 Drain pipe materials and sizes.

Components of the condensate disposal system shall be ABS, cast iron, copper, cross-linked polyethylene, CPVC, galvanized steel, PE-RT, polyethylene, polypropylene or PVC pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 30. Condensate waste and drain line size shall be not less than 3/4-inch (19 mm) nominal diameter from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an approved method. Drain pipes conveying condensate from cooling coils and evaporators shall be insulated with a minimum of R-3 when located inside a building's unconditioned space.

Information provided by the proponent:

Uninsulated condensate piping carries a cold fluid, condensate water from cooling coils. The moisture that is present in unconditioned spaces condenses on the pipes exterior surface and can drip onto walls and ceilings. This drip can cause water damage and support the growth of mold inside the building.

Additional cost to construction:

Minimal impact. Insulating condensate piping is common. Pipe insulation is relatively inexpensive.

Modification R12073: Addition of ANSI/MCA FTS-1 in Hurricane-Prone and TAS-125 Alignment.

R905.10.4.1 Metal hip and ridge covers. *Metal roof* hip and ridge covers shall be tested for uplift resistance in accordance with ANSI/MCA FTS-1.

Information provided by the proponent:

Proposed new reference standard, ANSI/MCA FTS-1 2019 is attached to Mod 12077.

The purpose of this proposal is to add new requirements to determination of wind load resistance values of metal roof panel assemblies over solid or closely fitted deck in hurricane-prone regions. These changes are consistent with the recommendations of FEMA P-2342.

This proposal also aligns panel testing requirements in hurricane-prone regions with Section 8 of the Florida Building Code (FBC) Test Application Standard TAS-125. This is necessary because UL 580 testing ceases at Class 90 (105 psf net uplift/52.5 psf design load) and will not produce results addressing wind loads in the edge and corner zones required by ASCE 7 2016 in hurricane-prone regions. While UL 1897 does not have this limitation, it lacks the two 1-hour-long oscillating load sequences required by UL 580 and is generally considered less rigorous for that reason. Section 8 of TAS-125 addresses these issues quite well and the resulting practice is already widely used in the metal roofing industry.

See attachment for technical explanation.

Additional cost to construction:

Property owners could see a very slight increase in cost if manufacturers carry additional costs to the consumer. However, the attachment shows this impact to be less than one percent increase.

Modification S11869: Add Backed Vinyl Siding to the code as a new category of vinyl siding, helping distinguish this product from Insulated Vinyl Siding.

[RB] Backed vinyl siding is a cladding product in which foam plastic backing is factory-applied as an integral component. Where the foam plastic functions as insulation, the product shall be considered *Insulated Vinyl Siding*.

R703.3.3 Minimum fastener length and penetration. [Revise as follows]

Fasteners shall have the greater of the minimum length specified in Table R703.3(1) or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding in accordance with ANSI/APA-PRP 210, fiber-cement panel siding and fiber-cement lap siding installed over foam plastic

sheathing shall penetrate not less than 11/2 inches (38 mm) into framing or shall be in accordance with the manufacturer's ~~installation~~ instructions.

2.Fasteners for hardboard panel and lap siding shall penetrate not less than 11/2 inches (38 mm) into framing.

3.Fasteners for vinyl siding, backed vinyl siding, and insulated vinyl siding shall be installed in accordance with Section R703.11 or R703.13.

4.Fasteners for vertical or horizontal wood siding shall penetrate not less than 11/2 inches (38 mm) into studs, studs and wood sheathing combined, or blocking.

5.Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined, as specified in Items 1 through 4.

R703.11.2 Installation over foam plastic sheathing.

Where vinyl siding, backed vinyl siding or *insulated vinyl* siding is installed over foam plastic sheathing, the vinyl siding shall comply with Section R703.11 and shall have a wind load design pressure rating in accordance with Table R703.11.2.

Exceptions:

1.Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other approved backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Sections R703.11.1 and R703.3.3.

2.Where the vinyl siding manufacturer's product specifications provide an *approved* wind load design pressure rating for installation over foam plastic sheathing, use of this wind load design pressure rating shall be permitted, and the siding shall be installed in accordance with the manufacturer's instructions.

3.Where the foam plastic sheathing and its attachment has a design wind pressure resistance complying with Sections R316.8 and R301.2.1, the vinyl siding shall be installed in accordance with Sections R703.11.1 and R703.3.3.

R703.13 Insulated vinyl siding, backed vinyl siding.

Insulated vinyl siding and backed vinyl siding shall be certified and labeled by an approved agency as conforming to the requirements of ASTM D7793 and D7445, respectively.

R703.13.1 Insulated vinyl siding, backed vinyl siding, and accessories.

Insulated vinyl siding, backed vinyl siding, and compatible accessories shall be installed in accordance with Sections R703.11.1, R703.11.2 and or the manufacturer's ~~installation~~ instructions.

Information provided by the proponent:

Including a definition for backed siding in the Florida Building Code is necessary to reflect advancements in siding products and ensure clear guidance for designers, contractors, and inspectors. Backed siding is a laminated board product combining vinyl and EPS foam, standardized to meet the Florida Building Code Residential (FBCR) requirements. This product has already been accepted into the International Building Code during the Group A cycle and offers unique performance benefits that warrant its inclusion in the code. The product has already been integrated into the International Building Code, aligning Florida's code with nationally recognized standards.

Additional cost to construction:

Although backed siding is 20%-30% more expensive than traditional vinyl siding, it remains a cost-effective alternative to other high-end clapboard-style cladding products.

Modification S11871: Change replaces the 16" OC stud fastening rule with a prescriptive table allowing tested fastener alternatives based on framing and sheathing. Backed by ASTM D5206 and engineering data, it permits ring shank nails where stud attachment is difficult, ensuring secure, code-compliant installation.

R703.11.1 Installation. [Revise as follows]

Vinyl siding, backed vinyl siding, insulated vinyl siding, and compatible accessories shall be installed in accordance with the manufacturer's instructions. For vinyl siding, backed vinyl siding, and insulated vinyl siding having a wind load design pressure rating of 30 psf or less and installed where the design wind pressure is of 30 psf or less in accordance with Table R301.2(2), the prescriptive fastening requirements of Table R703.11.1 shall be permitted. Provisions of Section R703.11.2 shall apply.

[Delete without substitution]

~~R703.11.1.1 Fasteners.~~

~~Unless specified otherwise by the manufacturer's instructions, fasteners for vinyl siding shall be 0.120-inch (3 mm) shank diameter nail with a 0.313-inch (8 mm) head.~~

~~R703.11.1.2 Penetration depth.~~

~~Unless specified otherwise by the manufacturer's installation instructions or in accordance with Table R703.3(1), fasteners shall penetrate into building framing. The total penetration into the sheathing, furring framing or other nailable substrate shall be a minimum 1 1/4 inches (32 mm).~~

~~R703.11.1.3 Spacing.~~

~~Unless specified otherwise by the manufacturer's installation instructions, the maximum spacing between fasteners for horizontal siding shall be 16 inches (406 mm), and for vertical siding 12 inches (305 mm) both horizontally and vertically. Where specified by the manufacturer's instructions and supported by a test report, alternative fastener spacing is permitted.~~

[Add new table as follows]

Table R703.11.1 Prescriptive Fastner Requirements for Vinyl, Backed Vinyl, and Insulated Vinyl Siding

Fastener ^a	Substrate ^b	Penetration depth ^c	Spacing
Smooth shank nail, not less than 0.120" diameter shank with 0.313(5/16)" head	Nailable Substrate	Not less than 1-1/4"	Horizontal siding - not greater than 16-inches on center
Ring shank nail, not less than 0.120" diameter shank with 0.313(5/16)" head	min. 7/16" thick nailable substrate	Through substrate plus a minimum of 1/4" through	Horizontal siding - not greater than 12-inches on center
Ring shank nail, not less than 0.120" diameter shank with 0.313(5/16)" head	> 15/32" thick nailable substrate	Through substrate plus a minimum of 1/4" through	Horizontal siding - not greater than 16-inches on center
Either smooth	min. 7/16"	Through	Vertical siding

<u>shank or ring shank nail (as specified above)</u>	<u>thick nailable substrate</u>	<u>substrate plus a minimum of 1/4" through</u>	<u>- Not greater than 12- inches on center each way</u>
<u>Ring shank nail, not less than 0.120" diameter shank with 0.313(5/16)" head or screw not less than 0.138 shank with a .423" truss washer-head</u>	<u>min. 3/4" thick wood furring^e</u>	<u>3/4" Into furring</u>	<u>Not greater than 12-inches on center</u>
24-INCH O.C. FRAMING (For 20 psf or less design wind pressure)^d			
<u>All fastener types (as specified above)</u>	<u>Nailable substrate</u>	<u>1-1/4"</u>	<u>Horizontal siding - Not greater than 24-inches on center</u>

- Fasteners shall comply with ASTM F1667
- Wood framing and furring shall have be Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir or other species with a specific gravity of equal to or greater than 0.42. in accordance with AWC NDS. Other nailable substrates with equal or greater fastener withdrawal performance shall also be permitted. Where fiberboard, gypsum, foam plastic or other non-nailable substrate is used, fasteners must go into studs or other form of nailable substrate.
- The total thickness of wood structural panel, wood furring, and other nailable substrates shall satisfy the required penetration depth.
- For 0.120 inch roofing nail only, 24 inches on center fastener spacing for horizontal siding shall be permitted where the allowable stress design wind pressure is 20 psf or less in accordance with-Table R301.2(2). Alternatively, it shall be permitted where the mean roof height of the building is 30 feet or less and the design wind speed does not exceed 115 mph for Exposure B or 110 mph Exposure C.
- Unless otherwise specified by the manufacturer's instructions, a material shall be provided in-between the furring that provides a flat surface to support the siding.

Information provided by the proponent:

This change updates the 16" OC stud fastening requirement with a prescriptive table allowing tested fastener alternatives based on framing and sheathing. Supported by ASTM D5206 and engineering data, it ensures secure installation by requiring ring shank nails where stud attachment is difficult, improving durability and compliance.

Additional cost to construction:

Adds about 25% in material costs, and potential additional labor costs. Estimated additional cost for an average 20 square home is between \$50-\$150.

Modification S11872: This change adds to the recently added requirements with vinyl siding and the importance of starter strip and utility trim. Larger openings need additional connection points for the siding over the top, as this increases the performance of the siding system.

R703.11.1.5 Utility trim and Snap Lock. Where horizontal siding has to be cut or trimmed below windows, and at the top of walls, the top edge of the siding shall be secured with utility trim and snap locks or as specified by the manufacturer's installation instructions. See Figures R703.11.1.5(1) and R703.11.1.5(2).

Where siding panels are installed above openings and have been field-trimmed at the bottom edge, the cut panel shall be supported with utility trim and snap locks.

1405.14.2.2 Utility trim

Under windows, at top of walls, utility trim shall be used with snap locks, and where siding panels are

installed above openings and have been field-trimmed at the bottom edge, the cut panels shall be supported with utility trim and snap locks.

Information provided by the proponent:

This change adds to the recently added requirements with vinyl siding and the importance of starter strip and utility trim. Larger openings need additional connection points for the siding over the top, as this increases the performance of the siding system.

Additional cost to construction:

This change would add about \$5 per opening that it impacts. So an average house might have 3-4 applications, resulting in \$15–\$20 per house addition.

Modification S12043: Inclusion of Section R328 - R330 in the HIGH-VELOCITY HURRICANE ZONE for Miami-Dade County

R301.1 Application.

Buildings and structures, and parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads and wind loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets the requirements for the transfer of loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

Exception: Buildings and structures located within the High Velocity Hurricane Zone shall comply with Sections R302 to ~~R328~~, R330 inclusive and the provisions of Chapter 44, Sections R301.2.5 and R406. In addition, buildings and structures located in flood hazard areas established in Table R301.2(1) shall comply with Sections R301.2.4, R301.2.5 and R322.

Information provided by the proponent:

Due to the proliferation of standby generators and the increase of more frequent and powerful wind events it is desired that these items be included in the High Velocity Hurricane Zone of Miami-Dade County. This will provide greater reliability in the event of a substantial storm event.

Additional cost to construction:

There will be little or no impact on industry relative to the cost of compliance with the code. This equipment is not mandatory, and any additional cost will be offset by savings in not incurring damage to the equipment.

Modification S12163: This proposal adds a new section to the code and is based on the corrosion resistance requirements in ICC 600-2020.

R332 CORROSION RESISTANCE - SALTWATER ENVIRONMENTS

R332.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 ft (914 m) of a saltwater coastline shall comply with Section R332.1.1 and R332.1.2.

Exception: Fasteners and connectors fully embedded in concrete or mortar.

R332.1.1 Screws, bolts and nails. Screws, bolts and nails shall be corrosion resistant by composition (stainless steel or nonferrous metal) or by coating or galvanization as specified in this section and Table R332.1.

R332.1.1.1 Stainless steel. Where required by Table R332.1, fasteners shall be manufactured from ASTM A240 Type 304, Type 305 or Type 316 stainless steel.

R332.1.1.2 Galvanized. Where required by Table R332.1, fasteners shall be in accordance with the following:

1. For fasteners with diameters greater than 3/8 inch (9.5 mm), the minimum corrosion resistance shall comply with or be

equivalent to ASTM A153, Class C.

2. For fasteners with diameters 3/8 inch (9.5 mm) and less, the minimum corrosion resistance shall comply with or be equivalent to one of the following methods:

2.1. ASTM A153, Class D.

2.2. ASTM A641, Class 3S.

2.3. Corrosion resistance exhibiting not more than 5 percent red rust after 1,000 hours of exposure in accordance with ASTM B117.

2.4. Corrosion resistance exhibiting not more the 5 percent red rust after 280 hours of exposure for nails, 1000 hours of exposure for roof tile fasteners or 360 hours of exposure for other carbon steel fasteners in accordance with ASTM G85, Annex 5.

R332.1.1.3 Compatibility. Fasteners used with connectors or other metal plates shall have a corrosion-resistant coating or composition that is compatible with the corrosion-resistant coating or composition of the connectors to prevent corrosion from galvanic action between dissimilar materials.

R332.1.2 Connectors and metal plates. Connectors and metal plates shall be corrosion resistant by composition (stainless steel or nonferrous metal) or by coating or galvanization as specified in this section and Table R332.1.

R332.1.2.1 Stainless steel. Where required by Table R332.1, connectors and metal plates shall be manufactured from ASTM A240 Type 316 stainless steel.

R332.1.2.2 Enhanced galvanizing. Where required by Table R332.1, connectors and metal plates shall be in accordance with one of the following:

1. Hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G185.
2. Hot-dipped galvanized after fabrication to meet ASTM A123 providing a minimum average coating weight of 2.0 oz./ft² (total both sides).
3. Provided with a protective coating as specified by TPI 1.

R332.1.2.3 Standard Galvanizing. Where required by Table R332.1, connectors and metal plates shall be in accordance with one of the following:

1. Hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G90.
2. Hot-dipped galvanized after fabrication to meet ASTM A123 providing a minimum average coating weight of 2.0 oz./ft² (total both sides).
3. Provided with a protective coating as specified by TPI 1.

TABLE R332.1

CORROSION RESISTANCE OF FASTENERS AND CONNECTORS

<u>Exposure Description^a</u>	<u>Building Location</u>	
	<u>Less than or equal to 300 feet</u>	<u>Greater than 300 feet and up</u>

	<u>from coastal shoreline</u>		<u>to 3000 feet from coastal shoreline</u>	
	<u>Screws, bolts, lag screws (including nuts and washers), nails and glulam rivets</u>	<u>Connectors and Metal Plates</u>	<u>Screws, bolts, lag screws (including nuts and washers), nails and glulam rivets</u>	<u>Connectors and Metal Plates</u>
<u>Exterior-Partially Sheltered and Exterior-Open Exposed</u>	<u>Stainless Steel in accordance with Section R332.1.1.1</u>	<u>Stainless Steel in accordance with Section R332.1.2.1</u>	<u>Galvanized in accordance with Section R332.1.1.2</u>	<u>Enhanced Galvanized in accordance with Section R332.1.2.2</u>
<u>Unconditioned Interior-Vented Enclosed</u>	<u>Galvanized in accordance with Section R332.1.1.2</u>	<u>Enhanced Galvanized in accordance with Section R332.1.2.2</u>	<u>Galvanized in accordance with Section R332.1.1.2</u>	<u>Enhanced Galvanized in accordance with Section R332.1.2.2</u>
<u>Unconditioned Interior-Unvented Enclosed</u>	<u>Galvanized in accordance with Section R332.1.1.2</u>	<u>Standard Galvanized in accordance with Section R332.1.2.3</u>	<u>Galvanized in accordance with Section R332.1.1.2</u>	<u>Standard Galvanized in accordance with Section R332.1.2.3</u>

Exposure Descriptions:

Exterior-Partially Sheltered locations are areas where fasteners and connectors are exposed to salt air, but not exposed to fresh rainwater to remove accumulated salt. **Exterior-Open Exposed locations** are areas where fasteners and connectors are exposed to salt air, but also exposed to rainwater to allow rinsing of the accumulated salt, and also more likely to dry after rain.

Unconditioned Interior-Vented Enclosed locations are those where fasteners and connectors inside a part of the building that also has vents to the outside environment that would allow salt air to enter.

Unconditioned Interior-Unvented Enclosed locations are those that are inside the building, but not in the conditioned space.

Information provided by the proponent:

This proposal is submitted on behalf of the Insurance Institute for Business and Home Safety (IBHS). Post-disaster assessments of wood-framed buildings following natural hazard events such as high winds, floods, and earthquakes have revealed that structural failures frequently occur at connections rather than in framing members. In coastal areas, where higher moisture and humidity levels exist and buildings are exposed to salt spray, corroded metal connectors and fasteners have been observed to contribute to the loss of an adequate load path. The loss of an adequate load path often results in damage to or failure of the structure.

This proposal is based on the corrosion resistance requirements in ICC 600-2020. While ICC 600-2020 is referenced in Section R301.2.1.1, it is not required by the code and therefore not mandatory for buildings. Research has shown that fasteners and connectors near the coastline exhibit corrosion where they are readily exposed to salt air and humidity, particularly if they are in a partially sheltered location where the salt is not washed off by rain. While the proposed table is adapted from ICC 600-2020 Section 505.3, the ICC 600 requirements and this proposal are based on the recommendations in the FEMA NFIP Technical Bulletin (TB) 8, Corrosion Protection for Metal Connectors and Fasteners in Coastal Areas in Accordance with the National Flood Insurance Program (June 2019). TB 8 can be viewed and downloaded at <https://www.fema.gov/sites/default/files/2020-07/tb8>

Metal connectors and fasteners are important elements in transferring loads from natural hazards (e.g., flood, wind, seismic) through a building. Corrosion rates for metal are dramatically higher in coastal environments than in less harsh, non-coastal environments. Therefore, it is important to increase the corrosion protection for metal connectors and fasteners in coastal environments. Studies have shown that stainless steel and thick hot-dip galvanized (G185 or higher) metal connectors and fasteners improve corrosion protection.

Additional cost to construction:

Slight increase in construction cost during the construction time.

Modification SW12013: Requires underwater lights on new residential pools to be low voltage.

4501.16.1 Voltage Limitation

Underwater lighting, or lighting that may be exposed to nozzle-directed pool water, shall not exceed 30 volts DC or 15 volts AC. Such lights shall be installed in accordance with the manufacturer's installation instructions and be listed by a nationally recognized testing laboratory.

Information provided by the proponent:

All underwater lights should be low voltage to reduce the possibility of electrical hazards in swimming pools and spas. Commercial swimming pools and spas have been successfully using low voltage lights for years.

Additional cost to construction:

Minimal, there is a slight increase in cost on light components but this will be offset with longer service LED lights now mandated under Federal rules.